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Leading the Nation in Transportation Excellence

Bridge Inspection Handbook 2015 Edition

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Bridge Inspection Handbook

2015 Edition

The Commonwealth of Massachusetts

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Governor

Karyn E. Polito
Lt. Governor

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Secretary & CEO

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Acting Administrator

MassDOT
Massachusetts Department of Transportation
Highway Division

Prepared by
The Massachusetts Department of Transportation
Highway Division
Bridge Section

April 2015

ACKNOWLEDGEMENTS

MassDOT would like to acknowledge the contributions made by the following individuals in the preparation of the MassDOT Bridge Inspection Handbook 2015 Edition. Their dedicated efforts have made this edition of the Bridge Inspection Handbook possible.

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The lower third photo from the left on the Bridge Inspection Handbook cover is courtesy of Michael Baker Jr, Inc

BRIDGE INSPECTION HANDBOOK
TABLE OF CONTENTS

CHAPTER 7: UNDERWATER OPERATIONS TEAM

CHAPTER 8: NON-NBI INSPECTIONS

CHAPTER 9: MassDOT SUPPLEMENTAL CODING GUIDE

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

The collapse of the "Silver Bridge" at Point Pleasant, West Virginia in 1967, and the subsequent investigation of the reasons for the failure of the structure, led to a congressional mandate to the US Department of Transportation/Federal Highway Administration (**USDOT/FHWA**) to develop a nationwide program of bridge inspections and suitable standards for these inspections. This led to the development of federal regulations known as the National Bridge Inspection Standards (NBIS).

The Massachusetts Department of Transportation, hence forth referred to as MassDOT, (formerly MassDPW) in 1970 began to formalize the inspection of MassDOT owned bridges in the Commonwealth by instituting a Bridge Inspection Program.

MassDOT's original program did not address bridges owned by other agencies or by cities and towns. This was the subject of subsequent findings from FHWA that also made federal funds available for the inspection of city and town owned bridges and "off-system" bridges. Presently, MassDOT inspects all city and town owned bridges that meet the federal definition of a bridge. MassDOT performs these inspections in recognition that various cities and towns do not have the ability to maintain and finance their own inspection programs that meet the NBIS and under the authority of Massachusetts General Laws (M.G.L.) Chapter 85 Section 35, which gives MassDOT the responsibility to determine the safe load carrying capacity of municipally owned bridges, something that cannot be accurately done without a bridge inspection.

In addition, MassDOT acts as "Lead Agency" in interaction with USDOT/FHWA. MassDOT is responsible for maintaining the inventory of all bridges within the Commonwealth. Other state agencies owning bridges in the Commonwealth maintain their own inspection programs, using the same NBIS criteria and report the results of inspections to MassDOT periodically for inclusion into the MassDOT submission to USDOT/FHWA.

1.2 PURPOSES OF BRIDGE INSPECTION

There are several warrants that justify the Bridge Inspection Program:

- Assure the safety of the traveling public on bridges
- Achieve and maintain compliance with the National Bridge Inspection Standards (NBIS) assuring eligibility for Federal-Aid Highway Bridge Replacement and Rehabilitation Program Funds
- Identify deficiencies to incorporate into the Asset Management Program that would initiate maintenance activities on and/or rehabilitation/replacement of structures

1.3 FUNCTIONS

The functions of a Bridge Inspection Unit include:

- Conducting bridge inspections
- Reporting the results of the inspections
- Evaluating the inspection results
- Maintaining a Bridge History File documenting the condition of all bridges in the State
- Maintaining an electronic bridge management and inventory database

To fulfill these functions, it is necessary to:

- Supervise and coordinate the work of the inspection force
- Provide training to the inspectors
- Review their performance
- Maintain records of inventories, inspections and bridge ratings
- Report the deficiencies found during inspection to appropriate authorities
- Report the safe load carrying capacity for bridges to the appropriate authorities
- Initiate recommendation to the State Bridge Engineer to reduce load limits or close bridges where necessary

1.4 NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)

The National Bridge Inspection Standards (NBIS) were first established in 1971 to set national policy regarding bridge inspection frequency, inspector qualifications, report formats, and inspection and rating procedures. The NBIS can be found in 23 CFR 650 Subpart C.

In addition, MassDOT has established its own standards as stated in Policy Directive Number P-13-002 dated 3/15/13; see Attachment 1-1.

1.4.1 MassDOT Qualification's and Training Requirements

All bridges in the NBIS Bridge Inventory shall be inspected by Teams lead by Team Leaders that meet the qualifications outlined in 23 CFR 650 Subpart C. MassDOT requires any Inspection Personnel participating in the inspection program to receive bridge inspection refresher training at a minimum of five year intervals. All requirements mentioned above also apply to consultant personnel that are performing inspections on behalf of the Department.

1.4.1.1 Team Leader Qualifications

All Team Leaders shall meet the requirements set forth and outlined in 23 CFR 650 Subpart C.

1.4.1.2 Team Member Qualifications

A Team Member must be physically able to participate and assist the Team Leader in performing the necessary functions of an inspection, which may require the individual to pick up and move a ladder, wade thru water in chest waders, lift and place a boat in waterways, and participate in inspections that require entering confined spaces.

It is desirable that all potential new Team Members meet **one** of the three prerequisite requirements for participation in a NHI course entitled *Safety Inspection of In-Service Bridges* (Course Number FHWA-NHI-130055), which they will have to participate in and successfully

pass. The three prerequisite requirements are 1) NHI course entitled *Engineering Concepts for Bridge Inspectors* (Course Number FHWA-NHI-130054), 2) NHI course entitled *Introduction to Safety Inspection of In-Service Bridges* (Course Number FHWA-NHI-130101), and/or 3) NHI course entitled a *Prerequisite Assessment for Safety Inspection of In-Service Bridges* (Course Number FHWA-NHI-130101A). The Team Member will be given an initial period of three months to fulfill the prerequisite requirements and upon successful completion, shall be enrolled in the next available session for the NHI course entitled *Safety Inspection of In-Service Bridges.*

1.4.2 Applicable Reference Materials for Bridge Inspectors

The proper reference material to be used by the bridge inspection personnel is to be the latest editions of the following:

- FHWA NHI Bridge Inspector's Reference Manual (BIRM)
- FHWA Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges
- AASHTO Manual for Bridge Evaluation (MBE)
- AASHTO Movable Bridge Inspection, Evaluation and Maintenance Manual
- Manual on Uniform Traffic Control Devices (MUTCD)
- AASHTO Element Level Inspection Manual
- 23 CFR 650 Subpart C (NBIS)
- MassHighway Work Zone Safety Manual

In order to carry out inspection function in accordance with the NBIS, the Bridge Inspectors shall follow all of the rules, regulations and technical data that pertain to Bridge Inspection contained in the latest editions of the above reference manuals.

1.5 BRIDGE INVENTORY DATABASE

As the "Lead Agency" in interactions with USDOT/FHWA, it is MassDOT's responsibility to maintain an inventory of all bridges within the Commonwealth. The inventory database that MassDOT uses for this purpose is called the *Bridge Inspection Management System*, which MassDOT developed for this purpose by customizing the commercially available 4D database software.

Each bridge in this database is inventoried by a unique Bridge Number (BDEPT) and Bridge Identification Number (BIN) combination, which are issued only by MassDOT. The Bridge Number and BIN also make up part of the Item 8 Structure Number that the USDOT/FHWA uses to identify Massachusetts bridge inventory data in its National Bridge Inventory.

Other state agencies, who own bridges in the Commonwealth, maintain their own inspection programs, using the same NBIS criteria as does MassDOT and they report the results of their inspections to MassDOT periodically for inclusion into the annual MassDOT submission of the bridge inventory to USDOT/FHWA. However, even if these agencies have their own inventory numbers for these structures, these bridges still require a unique MassDOT assigned Bridge Number and BIN combination for inclusion into the MassDOT bridge inventory.

Furthermore, the *Bridge Inspection Management System* is not limited to the inventory of NBIS length bridge structures. Massachusetts General Laws define a structure carrying a public highway with a span of over 10 feet as a bridge that comes under MassDOT purview. The MassDOT bridge inventory also includes other Non-NBIS structures such as: railroad structures, primarily owned by the MBTA, currently carrying live or abandoned rail lines over water and roadways; pedestrian or bikeway structures; culvert structures with a clear span of 4 feet or greater; structures carrying utilities over roadways and waterways; tunnels for vehicular access; and buildings constructed over roadways. These Non-NBIS structures are also issued a Bridge Number and BIN combination so that they can be included in the bridge inventory.

As a result, such structures regardless of owner must be issued a Bridge Number and BIN. There are usually two situations that will warrant a request for a BDEPT and/or BIN. The situations are:

1. An existing structure not previously in the inventory
2. A structure that is under design as a new structure or a replacement of an existing structure

Agencies requiring a BDEPT and/or BIN can submit a request to the State Bridge Engineer along with the necessary documentation. Other MassDOT responsible parties and municipalities that are involved in the design, rehabilitation or replacement of existing structures, including culverts, should submit a BDEPT/BIN request to make sure that the inventory numbers they are using are correct or if new numbers should be issued, based on the type of project.

All requests are to be submitted to the State Bridge Engineer in accordance with the procedures outlined in Section 9.3. The State Bridge Engineer will decide if a new BDEPT and/or BIN should be issued or not. When requesting a Bridge Number/BIN, the Bridge Number/BIN Request Form, shown in Attachment 1-2, shall be used. The request shall have back-up documentation that includes: for bridges under design, plan and elevation sheet from the Sketch Plans; for existing bridges being inventoried for the first time, plans (if available), the physical location of the structure (google map, latitude and longitude coordinates), and photos (elevation, underside and approaches).

1.6 ABOUT THE HANDBOOK

It is the policy of MassDOT to comply with or exceed NBIS Standards. MassDOT policies of a general and specific nature that apply to the Bridge Inspection Unit are included in each of the chapters of this Handbook.

The purpose of the Bridge Inspection Handbook is to provide direction for the Bridge Inspection Unit (BIU) in complying with the National Bridge Inspection Standards (NBIS). The Bridge Inspection Handbook provides guidance to the members of the Bridge Inspection Unit needed to perform assigned tasks.

This Handbook is divided into chapters, with each chapter divided into various sections. Any corresponding attachments associated with each chapter will be located at the end of the particular chapter and will be number “X-Y”, where “X” will refer to the chapter number and “Y” will refer to the attachment number.

Attachments at the end of the chapters that are sample cover letters that are signed by the District Highway Director are shown with the intent to have the minimum language required. Each District reserves the right to add additional language as needed.

1.6.1 Summarization of Abbreviations and Acronyms Used Throughout the Handbook

Contained in Attachment 1-3 is a list of commonly used abbreviations and acronyms contained throughout this Handbook.

1.6.2 Revisions to the Handbook

Any revisions to the Handbook, further explanation or clarification, or additional information that may require insertion into the Handbook will be incorporated and reflected as a new section with the date of the revision stated in the section heading. Furthermore, the Table of Contents shall be revised to reflect the revised section and date of revision.

1.6.3 Supplemental Information

Chapter 10 will contain information/directions distributed from the Bridge Inspection Engineer for clarification on issues or policies that may arise through the duration of this Handbook. Some of the information/directions provided may lead to revised sections being issued in the future for inclusion in the Handbook.

1.7 PERMANENT HOLDING LOCATION

The most current copy of this Bridge Inspection Handbook will be contained on the MassDOT website. Revisions to any sections of this Handbook shall be listed on the website with a corresponding revision date and shall supersede all sections prior to the revision date.

1.8 CHAPTER 1 ATTACHMENTS

Number: P-13-002
Date: 3/15/2013

POLICY DIRECTIVE

Frank DePaola P.E. (signature on original)

ADMINISTRATOR

Bridge and Tunnel Inspection Standards and Procedures

The purpose of this Policy Directive is to identify the bridge and tunnel inspection standards and procedures of the Massachusetts Department of Transportation, Highway Division.

All bridges and tunnels to be inspected by the Massachusetts Department of Transportation, Highway Division, shall be inspected in accordance with the standards and procedures identified in this Policy Directive.

This policy recognizes that Chapter 25 of the Acts of 2009 formally abolished the Massachusetts Highway Department ("MassHighway") and the Massachusetts Turnpike Authority ("MTA"), established the Massachusetts Department of Transportation ("MassDOT") and enabled MassDOT with all powers and responsibilities necessary to manage the assets and programs formerly managed by MassHighway and MTA. Thus, all references to MassHighway and MTA within the standards and procedures identified in this Policy Directive apply fully to MassDOT.

1. All highway bridges shall be inspected in accordance with:

   - National Bridge Inspection Standards, 23 CFR Part 650 Subpart C
   - AASHTO Manual for Bridge Evaluation
   - MassHighway Bridge Inspection Handbook
   - MassHighway Bridge Manual

2. In addition to the standards and procedures listed in Part 1 above, the following highway bridges shall also be inspected in accordance with the relevant volumes of the Central Artery/Tunnel Inspection and Maintenance Manual dated May 2003, with addenda dated February 2005:

   - Leonard P. Zakim Bunker Hill Bridge (Volume 1)
   - North of Charles River Bridges (Volume 2)
   - South Bay Interchange Bridges (Volume 4)
   - I-90/Route 1A Interchange (Volume 7)

Page 1 of 2

Attachment 1-1: Policy Directive P-13-002, Page 1 of 2

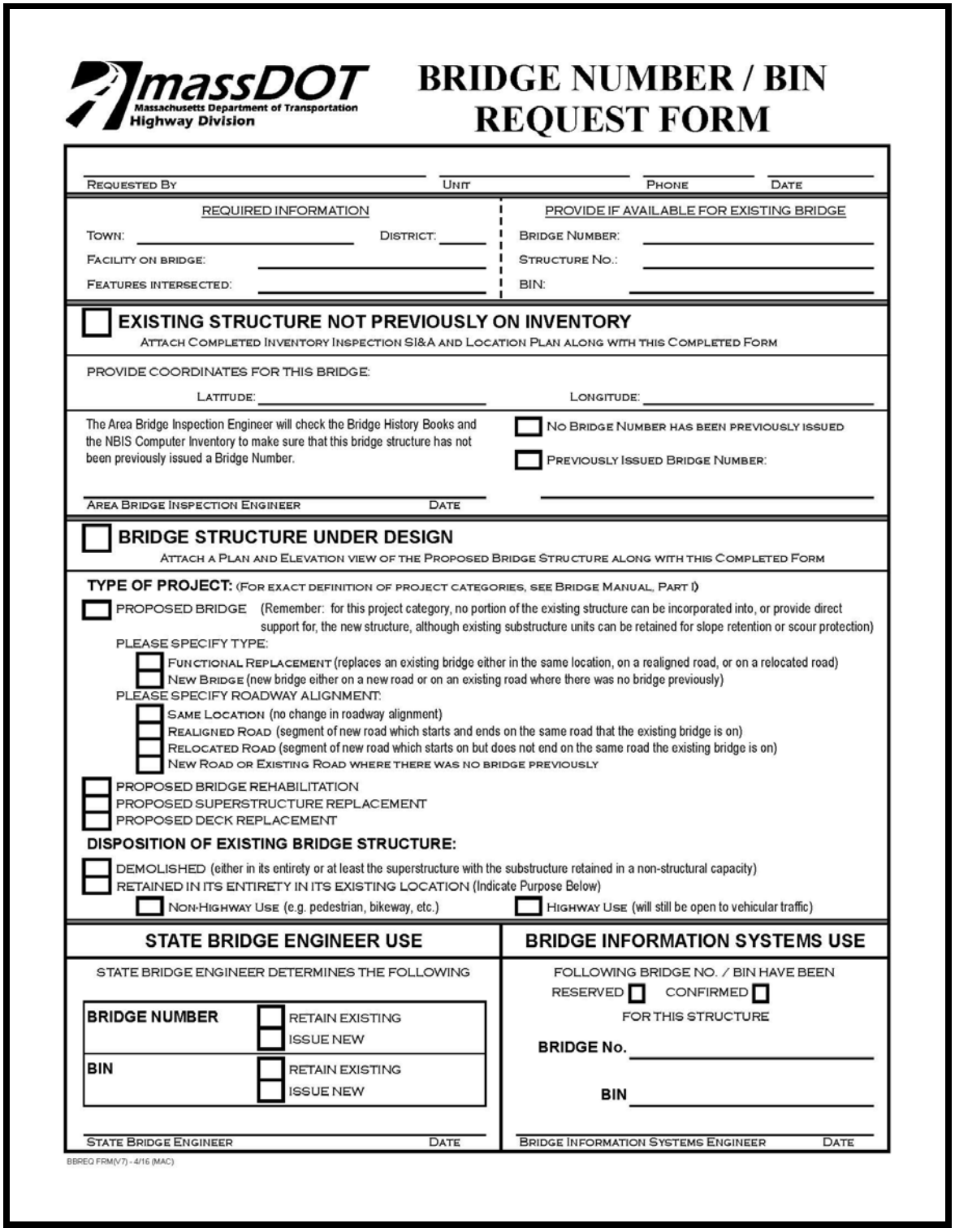
3. All rail bridges shall be inspected in accordance with:

   - Federal Highway Administration Railway and Transit Inspection Manual

4. All highway tunnels shall be inspected in accordance with:

   - MassDOT Highway Division Policy Directive P-13-003 "Tunnel Inspection and Testing Program" dated March 15, 2013
   - MassDOT Highway Division Policy Directive P-13-004 "Tunnel Inspection and Testing Protocol for Roadways Covered by Air Rights Developments" dated March 15, 2013

Attachment 1-1: Policy Directive P-13-002, Page 2 of 2



MassDOT Massachusetts Department of Transportation Highway Division

BRIDGE NUMBER / BIN REQUEST FORM

REQUESTED BY _____ UNIT _____ PHONE _____ DATE _____

REQUIRED INFORMATION

TOWN: _____ DISTRICT: _____

FACILITY ON BRIDGE: _____

FEATURES INTERSECTED: _____

PROVIDE IF AVAILABLE FOR EXISTING BRIDGE

BRIDGE NUMBER: _____

STRUCTURE NO.: _____

BIN: _____

☐ **EXISTING STRUCTURE NOT PREVIOUSLY ON INVENTORY**

ATTACH COMPLETED INVENTORY INSPECTION SI&A AND LOCATION PLAN ALONG WITH THIS COMPLETED FORM

PROVIDE COORDINATES FOR THIS BRIDGE:

LATITUDE: _____ LONGITUDE: _____

The Area Bridge Inspection Engineer will check the Bridge History Books and the NBIS Computer Inventory to make sure that this bridge structure has not been previously issued a Bridge Number.

☐ NO BRIDGE NUMBER HAS BEEN PREVIOUSLY ISSUED

☐ PREVIOUSLY ISSUED BRIDGE NUMBER: _____

AREA BRIDGE INSPECTION ENGINEER _____ DATE _____

☐ **BRIDGE STRUCTURE UNDER DESIGN**

ATTACH A PLAN AND ELEVATION VIEW OF THE PROPOSED BRIDGE STRUCTURE ALONG WITH THIS COMPLETED FORM

TYPE OF PROJECT: (FOR EXACT DEFINITION OF PROJECT CATEGORIES, SEE BRIDGE MANUAL, PART I)

☐ PROPOSED BRIDGE (Remember: for this project category, no portion of the existing structure can be incorporated into, or provide direct support for, the new structure, although existing substructure units can be retained for slope retention or scour protection)

PLEASE SPECIFY TYPE:

☐ FUNCTIONAL REPLACEMENT (replaces an existing bridge either in the same location, on a realigned road, or on a relocated road)
☐ NEW BRIDGE (new bridge either on a new road or on an existing road where there was no bridge previously)

PLEASE SPECIFY ROADWAY ALIGNMENT:

☐ SAME LOCATION (no change in roadway alignment)
☐ REALIGNED ROAD (segment of new road which starts and ends on the same road that the existing bridge is on)
☐ RELOCATED ROAD (segment of new road which starts on but does not end on the same road the existing bridge is on)
☐ NEW ROAD OR EXISTING ROAD WHERE THERE WAS NO BRIDGE PREVIOUSLY

☐ PROPOSED BRIDGE REHABILITATION
☐ PROPOSED SUPERSTRUCTURE REPLACEMENT
☐ PROPOSED DECK REPLACEMENT

DISPOSITION OF EXISTING BRIDGE STRUCTURE:

☐ DEMOLISHED (either in its entirety or at least the superstructure with the substructure retained in a non-structural capacity)
☐ RETAINED IN ITS ENTIRETY IN ITS EXISTING LOCATION (Indicate Purpose Below)

☐ NON-HIGHWAY USE (e.g. pedestrian, bikeway, etc.) ☐ HIGHWAY USE (will still be open to vehicular traffic)

STATE BRIDGE ENGINEER USE

STATE BRIDGE ENGINEER DETERMINES THE FOLLOWING

BRIDGE NUMBER	☐ RETAIN EXISTING ☐ ISSUE NEW
BIN	☐ RETAIN EXISTING ☐ ISSUE NEW

STATE BRIDGE ENGINEER _____ DATE _____

BRIDGE INFORMATION SYSTEMS USE

FOLLOWING BRIDGE NO. / BIN HAVE BEEN
RESERVED ☐ CONFIRMED ☐
FOR THIS STRUCTURE

BRIDGE No. _____

BIN _____

BRIDGE INFORMATION SYSTEMS ENGINEER _____ DATE _____

BBREQ FRM(V7) - 4/16 (MAC)

Attachment 1-2: Bridge Number/BIN Request Form

List of Abbreviations and Acronyms

ABIE	Area Bridge Inspection Engineer	HOC	Highway Operations Center
ADBIE	Assistant District Bridge Inspection Engineer	IOM	Interoffice Memorandum
ADTT	Average Daily Truck Traffic	MassDOT	Massachusetts Department of Transportation
BIE	Bridge Inspection Engineer	MBE	Manual for Bridge Evaluation
BIMS	Bridge Inspection Management System	MEMA	Massachusetts Emergency Management Agency
BIN	Bridge Identification Number	MGL	Massachusetts General Laws
BIRM	Bridge Inspectors Reference Manual	MUTCD	Manual on Uniform Traffic Control Devices
BIU	Bridge Inspection Unit	NBI	National Bridge Inspection
CH/I	Critical Hazard Deficiency/Immediate Urgency	NBIS	National Bridge Inspections Standards
Chapter 634	Massachusetts General Laws – Chapter 634	NHI	National Highway Institute
CS	Condition State	NOAA	National Oceanographic & Atmospheric Administration
CS/I	Critical Structural Deficiency/Immediate Urgency	OOF	Out of Frequency
DAN	Divers Alert Network	PM	Project Manager
DBE	District Bridge Engineer	PPE	Personnel Protective Equipment
DBIE	District Bridge Inspection Engineer	QA/QC	Quality Control / Quality Assurance
DEF	Deficiencies	R&O	Ratings & Overload Unit
DHD	District Highway Director	SCUBA	Self-Contained Underwater Breathing Apparatus
ELBID	Element Level Bridge Inspection Data	SIA	Structure Inventory and Appraisal Sheet
ELCS	Element Level Condition State	TL	Team Leader
ERS	Event Reporting System	TM	Team Member
F/T	Freeze/Thaw	U/W	Underwater
FC	Fracture Critical	UOT	Underwater Operations Team
FCM	Fracture Critical Member	USDOT	United States Department of Transportation
FHWA	Federal Highway Administration	USGS	United States Geological Survey

Attachment 1-3: List of Abbreviations and Acronyms

CHAPTER 2
GENERAL SAFETY REQUIREMENTS

2.1 INTRODUCTION

Safety is everyone's business. As an employer, MassDOT is obligated to promote job safety and furnish safe tools, equipment, and proper training. Supervisors must ensure that those under their supervision receive the proper training and that they practice safety at the work site.

When performing bridge inspections, MassDOT employs a minimum of two-person teams comprised of a Team Leader and a Team Member. If everyone does their share, accidents will be minimized.

2.2 PERSONNEL

Personnel must be physically and emotionally capable of performing inspection duties. They must be well-rested and alert when reporting to work, not be taking any drugs that cause dizziness or drowsiness, or any drugs containing alcohol. They must be properly trained, possess common sense, good judgment and a good attitude.

A systematic approach to the inspection process and safety aspects is vital to a good, safe performance. The inspection team should establish a checklist of things that must be done prior to and during the actual inspection to assure a safe, thorough, efficient inspection process.

2.3 CLOTHING

Personnel ***must*** wear hard hats, rugged shoes, clothes that fit well and are not loose or constricting in conformance with current MassDOT policy. A safety vest of appropriate color and reflectivity ***must*** be worn when working on roadways or railroads.

A safety harness and lanyard ***must*** be worn when working in a lift vehicle or bucket truck and on high climbs.

On high bridges over water as necessary, a safety boat with life jackets and ring buoy on board should be in the water at the approximate location beneath the inspectors. (NOTE: ***Do not place the boat directly beneath the inspectors--a fall into water is preferable to a fall into a boat***!).

Gloves and a tool belt or pouch should be worn as necessary during inspections.

When necessary, specialized equipment should be worn such as face masks, goggles, and other protective equipment. Eye and face protection equipment will be kept clean and in good repair. The use of this type of equipment with structural or optical defects is prohibited.

2.4 EQUIPMENT

All inspection personnel shall adhere to requirements stated in MassDOT Policy Directive P-14-003 dated 9/25/14, see Attachment 2-1.

2.4.1 Advance Work Signs & Safety Cones

Work signs and cones, sufficient to mark the operation with good sight distance for adequate warning, shall be carried in each inspection vehicle. Inspection vehicles used for Bridge Inspection shall be equipped with flashing warning lights.

For higher volume highways, inspection work should be planned in advance with prior arrangement made with the traffic support group for a safety setup. ***The Manual of Uniform Traffic Control Devices (MUTCD) must be followed for these operations***.

2.4.2 Ladders

Except where either permanent or temporary stairways or suitable ramps or runways are provided, ladders described in this Subsection shall be used to give safe access to most elevations.

The use of ladders with broken or missing rungs or steps, broken or split side rails, or other faulty or defective construction is prohibited. When ladders with such defects are discovered, they shall be tagged defective and immediately withdrawn from service. Inspection of metal ladders shall include checking for corrosion of interiors of open end hollow rungs.

Portable ladder feet shall be placed on a suitable base, and the area around the top and bottom of the ladder shall be kept clear.

Portable ladders shall be used at such a pitch that the horizontal distance from the top support to the foot of the ladder is about 1/4 of the working length of the ladder (the length along the ladder between the foot and the top support). Ladders shall not be used in a horizontal position as platforms, runways, or scaffolds.

Unless protected by the required traffic control measures, ladders shall not be placed in median shoulders, sidewalks, driveways, railroads, or any location where they may be displaced by traffic or maintenance activities.

The side rails of the ladder shall extend not less than 36 inches above the landing, wherever possible.

Portable ladders in use shall be tied, blocked, or otherwise secured to prevent movement. In most cases, the second inspector foots the bottom of the ladder to ensure the stability of the ladder.

Ladders made of fiberglass or other non-conducting material shall be used where there is any chance the inspector or the ladder shall come in contact with electrical conductors. Portable metal ladders will not be used at these locations. Commercial grade fiberglass ladders must be used near wires. (NOTE: Assume that all wires carry a lethal current and treat them accordingly).

2.4.3 Scaffolding

Bridge inspectors rarely work from scaffolds and then only on scaffolds erected by support staff. For the safety of the inspection team, it is essential that the scaffolds meet applicable safety requirements.

The footing or anchorage for scaffolds will be sound, rigid, and capable of carrying the maximum intended load without settling or displacing.

Unstable objects such as barrels, boxes, loose brick, or concrete blocks, will not be used to support scaffolds or planks.

The scaffold should be tied off at the top to prevent tipping. Double layers of 2 inch planks at least 10 inches wide should be used.

2.4.4 Safety Harness and Lanyards

Safety harnesses, and lanyards will be used only for employee safeguarding. Any safety harnesses, or lanyard actually subjected to service loading, as distinguished from static load testing, shall be immediately removed from service and will not be used again for employee safeguarding. The recommended service life of the equipment should not be exceeded.

Safety harness lanyards will be a maximum length to provide for a fall of no greater than 6 feet. The rope shall have a nominal breaking strength of 5,400 pounds.

2.4.5 Tools – Hand and Power

All hand and power tools and similar equipment shall be maintained in a safe condition. Impact tools such as chisels shall be kept free of mushroomed heads. The wooden handles of tools will be kept free of splinters or cracks. When a power tool is used, all safety rules recommended by the manufacturer shall be followed.

Misuse of tools is the major cause of accidents on the job. Each tool is designed for a particular function and should be used accordingly. Keep tools in good repair, sharpened if required, and clean. Use tools as intended only. ***Use the right tool for the task***. Avoid injury due to tool slippage, which could cause a fall.

2.4.6 Life Jackets or Buoyant Work Vests

Employees working over or near water, where the danger of drowning exists, will be provided with U.S. Coast Guard approved life jackets or buoyant work vests. Prior to and after each use, the buoyant work vests or life preservers will be inspected for defects which would alter their strength or buoyancy. Defective units will not be used.

Where inspectors must work without being tied off, these additional safety devices must be available: a ring buoy and a skiff. The ring buoy must have at least 90 feet of line readily available for emergency rescue operations. A lifesaving skiff shall be immediately available (depending on situation) at locations where inspectors are working over or adjacent to water.

2.5 ACCESS MEANS

2.5.1 Confined Space Entry

Inspectors who are required to enter into confined or enclosed spaces must have been trained so that they are appropriately cautioned as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of protective and emergency equipment required. Refer to Subsection 2.2.5 of the FHWA/Bridge Inspector's Reference Manual (Publication No. FHWA NHI 12-049, dated October 2002, Revised December 2006, and Revised February 2012). Inspection of locations where toxic fumes or lack

of sufficient oxygen may be hazardous falls into this category. Prior to entry, inspectors **shall** contact the District Safety Inspector.

2.5.2 Aerial Lifts, Lift Buckets and Snooper Trucks

Equipment used by the Department in bridge safety inspections includes aerial lifts, bucket trucks, and snooper trucks. Only persons that have been trained to operate the equipment shall use the equipment. Belting off to an adjacent pole, structure, or equipment while working from an aerial lifts, bucket trucks or snoopers will not be permitted. A safety harness shall be worn with a lanyard attached to the equipment when in use. Bucket and platform load limits specified by the manufacturer shall not be exceeded.

Qualified properly licensed personnel should operate vans, lift trucks and the Underbridge Snoopers. The vehicles should be inspected and serviced regularly and kept in good repair. Operators should avoid moving a vehicle with the lift or bucket extended unless (as the snooper) it is intended for this type of operation. Extreme caution should be exercised.

2.5.3 Catwalks

Caution shall always be used. If accessible, inspection of the catwalk system shall be performed prior to the use of the catwalk. It shall be noted that as a bridge component, the catwalk system is subject to deterioration.

2.5.4 Rigging and Staging

Rigging and staging requires a support staff with a qualified rigger to insure adequacy and safety.

2.6 FIRST AID, EMERGENCY CONTACTS AND ACCIDENTS

2.6.1 First Aid

Each MassDOT inspection vehicle shall be equipped with a first aid kit with periodic replenishment of contents as they are used or expired.

2.6.2 Immediate Life Threatening Injuries

If a team encounters a situation where there are immediate life threating injuries, they shall call 911 for the local ambulance service and local fire department.

2.6.3 Emergency Contact Numbers

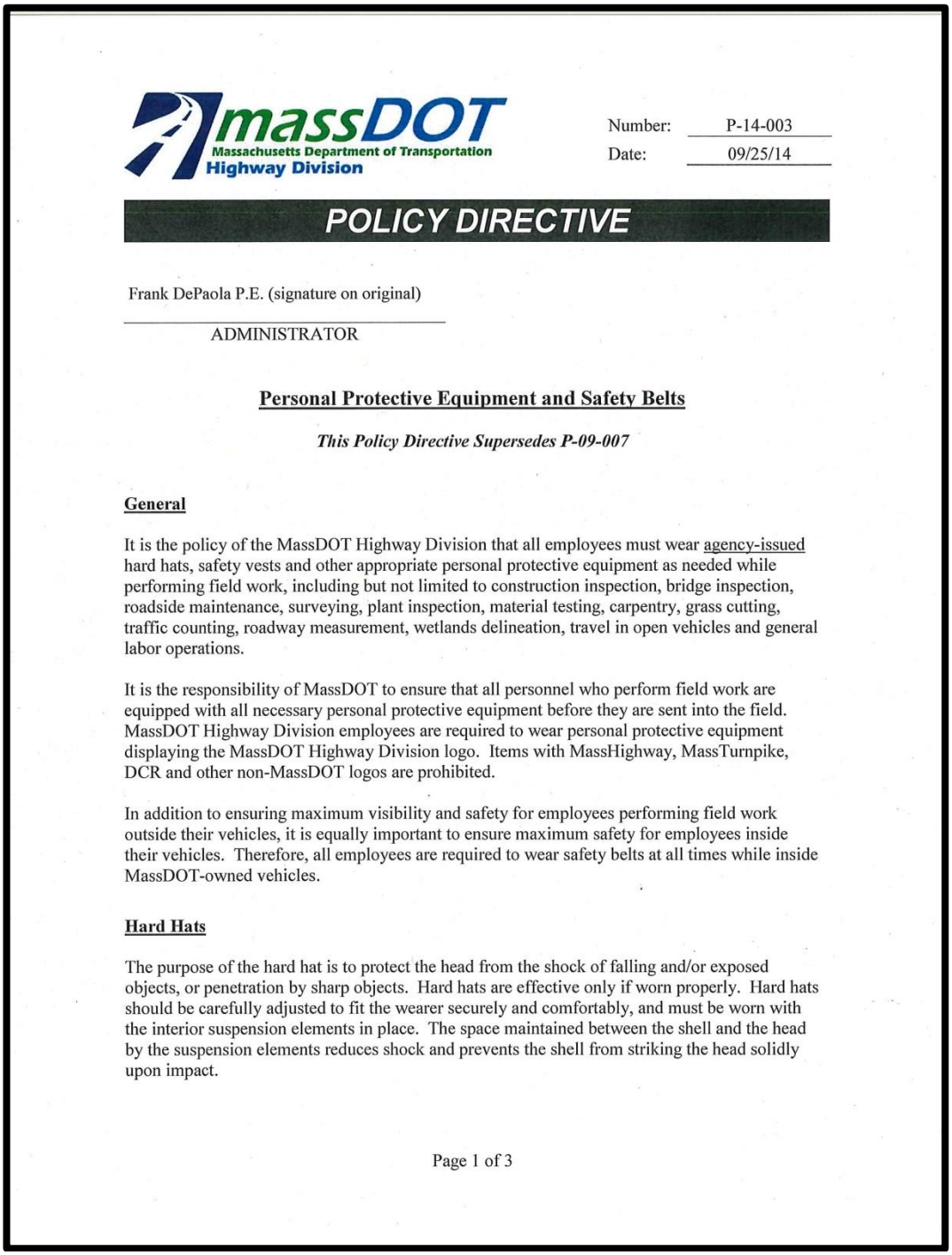
Inspectors will contact the District Radio Room when Emergencies arise.

2.6.4 Accidents

It is important that all accidents are reported promptly. Incidences shall be reported to the District Human Resources Official or the Boston Human Resources Official. Prompt reporting protects the employee and employer, and initiates a series of events beneficial to everyone concerned. It starts an investigation of the cause of the accident. It starts discussions of possible methods to prevent future

recurrence. It starts preparation of information for safety seminars and safety training courses. It shall be noted that any incidences that may occur to any of the District Bridge Inspection Personnel, shall be reported to the Area Bridge Inspection Engineer and to the Bridge Inspection Engineer.

2.7 CHAPTER 2 ATTACHMENTS



massDOT
Massachusetts Department of Transportation
Highway Division

Number: P-14-003
Date: 09/25/14

POLICY DIRECTIVE

Frank DePaola P.E. (signature on original)
ADMINISTRATOR

Personal Protective Equipment and Safety Belts

This Policy Directive Supersedes P-09-007

General

It is the policy of the MassDOT Highway Division that all employees must wear agency-issued hard hats, safety vests and other appropriate personal protective equipment as needed while performing field work, including but not limited to construction inspection, bridge inspection, roadside maintenance, surveying, plant inspection, material testing, carpentry, grass cutting, traffic counting, roadway measurement, wetlands delineation, travel in open vehicles and general labor operations.

It is the responsibility of MassDOT to ensure that all personnel who perform field work are equipped with all necessary personal protective equipment before they are sent into the field. MassDOT Highway Division employees are required to wear personal protective equipment displaying the MassDOT Highway Division logo. Items with MassHighway, MassTurnpike, DCR and other non-MassDOT logos are prohibited.

In addition to ensuring maximum visibility and safety for employees performing field work outside their vehicles, it is equally important to ensure maximum safety for employees inside their vehicles. Therefore, all employees are required to wear safety belts at all times while inside MassDOT-owned vehicles.

Hard Hats

The purpose of the hard hat is to protect the head from the shock of falling and/or exposed objects, or penetration by sharp objects. Hard hats are effective only if worn properly. Hard hats should be carefully adjusted to fit the wearer securely and comfortably, and must be worn with the interior suspension elements in place. The space maintained between the shell and the head by the suspension elements reduces shock and prevents the shell from striking the head solidly upon impact.

Page 1 of 3

Attachment 2-1: Policy Directive P-14-003, page 1 of 3

Employees should inspect hard hats for dents, cracks, brittleness (by striking on concrete or other hard surface), tears or other damages before each use. Both the shell and the suspension elements should be inspected. In the event the hard hat is damaged, the employee shall not be required or allowed to perform field work until an undamaged hard hat is provided by MassDOT. Employees with damaged hard hats shall notify their supervisors, who shall then be responsible for confirming the damage and for ensuring that an undamaged hard hat is provided to the employee.

Employees should periodically clean their hard hats and shall keep their hard hats free from paint, decals, writing, or other foreign substances.

Only the MassDOT Highway Division logo will be allowed on the hard hats, with the exception of required decals for certain types of work, such as track-related activities, or other decals specifically approved by MassDOT for use by certain employees, on special projects, or for similar reasons.

Safety Vests

The purpose of the safety vest is to make the worker more visible to drivers and others in all weather conditions, day or night. Safety vests should fit securely and must be worn with the reflective material facing outward to ensure maximum effectiveness. ANSI Class and Level II or Level III ratings are required and manufacturer's tags that indicate these ratings should not be removed from any garments.

Vests should be kept clean and free from paint, decals, writing or other foreign substances. Employees should inspect safety vests and reflective striping for tears or other damage before each use. In the event the safety vest is damaged, the employee shall not be required or allowed to perform field work until an undamaged safety vest is provided by MassDOT. Employees with damaged safety vests shall notify their supervisors, who shall then be responsible for confirming the damage and for ensuring that an undamaged safety vest is provided to the employee.

Other Personal Protective Equipment

When necessary, employees shall wear safety glasses and/or gloves for protection against flying debris, chemicals, hazardous substances, and other items that may be harmful to otherwise unprotected eyes and hands. Safety glasses and gloves should be kept as clean as possible and should be inspected for defects before each use. Open toe shoes, sneakers or similar footwear may not be worn by employees working in the field or around equipment.

In addition to the equipment described herein, certain job functions may also require the use of other personal protective equipment, such as goggles, face shields, ear protection, fall protection (harnesses, lanyards/retractables for unprotected fall hazards, as well as for personal lifts) masks/respirators and hazardous materials suits. This type of equipment shall be worn in accordance with all other relevant directives, guidelines, specifications and Standard Operating Procedures specifically intended for its use, and nothing in this policy shall supersede such other requirements.

Attachment 2-1: Policy Directive P-14-003, page 2 of 3

Safety Belts

Seat belts save lives. All employees in MassDOT Highway Division vehicles shall fasten their seat belts in accordance with the manufacturer's instructions for the make and model of vehicle being used. Tampering with seat belts, or operation not in accordance with the manufacturer's instructions is prohibited.

Compliance with Policy Requirements

Employees are responsible for complying with the requirements of this policy. Failure to comply will result in formal disciplinary action, up to and including suspension without pay and/or termination.

Strict adherence to the use of agency-issued personal protective equipment (hard hats, safety vests, jackets, etc.) will be enforced. The Highway Safety Inspectors will monitor and report non-compliance with this policy statewide. Division Heads, Section Heads, managers and supervisors are responsible for ensuring that employees under their jurisdiction comply with the requirements of this policy.

Operators of vehicles are responsible to ensure that passengers in their vehicles are in compliance with this policy. Failure to comply may result in formal disciplinary action, up to and including suspension without pay and/or termination.

Attachment 2-1: Policy Directive P-14-003, page 3 of 3

CHAPTER 3
INSPECTION FREQUENCY, SCHEDULING AND COORDINATION

3.1 INTRODUCTION

MassDOT has established bridge inspection frequencies that conform to the requirements set forth in 23 CFR 650 Subpart C for all bridges under its jurisdiction. This is implemented with the aid of the Bridge Inspection Management System (4D) that allows for the scheduling and programing of the bridge inspections.

MassDOT policy is to inspect all bridges within their established frequency. The responsibility for performing inspections within their established frequencies has been delegated to the appropriate Districts and Agencies. The Boston Bridge Inspection Unit monitors the conformance of inspection dates with the required frequencies. If a bridge inspection is completed out of frequency, the DBIE or Agency representative must provide the Bridge Inspection Engineer with a written explanation of the reason for the delay for inclusion into the NBIS history file located in Boston. Also, a copy of the written explanation shall be placed in the District history file.

The District Bridge Inspection Engineer (DBIE) is allowed to move bridges within an established frequency for a number of reasons, for example, water flow conditions, access restrictions, special requests, etc. At no time is the DBIE allowed to increase the frequency of an inspection.

The DBIE is required to evaluate the upcoming workload from month to month in their District and request consultant services to help, when needed, to meet the frequencies. When scheduling inspections, the DBIE must take into account the type of inspections required. Special Member Inspections are to be scheduled with the highest priority. All Special Member Inspections shall be performed when scheduled, and no "out of frequencies" (OOF) will be allowed on these types of inspections.

In this chapter, procedures have been standardized for requesting and obtaining police details, railroad flag protection and traffic management services. This standardization is required to help facilitate the process of paying invoices in a timely manner. The DBIE may delegate the task required to coordinate the inspection to various members of their staff.

3.2 INSPECTION TYPES AND FREQUENCIES

All bridges in the NBIS Bridge Inventory shall be inspected by team leaders that meet the qualifications outlined in 23 CFR 650 Subpart C. Common types of Inspections and their frequencies are as follows:

3.2.1 Routine Inspection

Routine Inspections are a "hands on" Inspection. MassDOT's Routine Inspection exceeds the level of inspection as referenced in the MBE in that the inspections are more of an "in-depth" inspection. Elements that exhibit deficiencies are accessed so documentation can be collected. The term "hands on" is meant to signify that the inspector must be at arm's length from the structural member being inspected. The hand's on inspection consists of observations and measurements, to determine the condition of the structural elements as compared to the previously recorded condition.

Routine Inspections are performed at regular intervals not to exceed twenty- four months.

3.2.2 Fracture Critical Inspection

Fracture Critical Inspections are performed on structures that have been determined to be fracture critical. Fracture Critical bridges are structures that have Fracture Critical Members (FCM's). Inspections are hands on and consist of the inspection of all FCM's as identified in the documented Fracture Critical Procedures that are on file in both the District and Boston offices. The NBIS Regulations require that Fracture Critical procedures be on file for Fracture Critical structures. As per Article 3.6.1.6 of the 2013 LRFD Bridge Manual, any Designer of a Fracture Critical bridge shall submit the procedure for the inspection of it to the Boston Bridge Inspection Engineer. This procedure will be placed in the history file and a copy of the procedure will be forwarded to the District.

The Fracture Critical Inspection is to be scheduled at the same time the Routine Inspection is performed unless circumstances arise that will require the frequency to be reduced to address deficiencies noted in previous inspections.

Fracture Critical Inspections are to be performed at regular intervals not to exceed twenty- four months.

3.2.3 Underwater Inspection

Underwater Inspections are performed on the underwater portions of bridge structures and the surrounding channel. These inspections may include soundings and probing to locate channel bottom and substructure undermining as well as conditions of submerged substructure elements. The MassDOT dive team may perform underwater inspections when water depths are too deep for inspectors to adequately assess conditions of the submerged elements. Customarily, underwater inspections occur on structures when depth of water along the substructure elements exceeds three feet.

Underwater Inspections are to be performed at regular intervals, generally 36 months, but not to exceed 60 months.

3.2.4 Special Member Inspection

Special Member Inspections are performed on a reduced frequency for every bridge in the NBIS inventory that has an overall condition rating of 4 or less (poor condition) for the deck, superstructure or substructure (Items 58, 59, 60 and 62 respectively). The Special Member Inspection is performed on those particular structural element(s) that are responsible for the poor condition rating for the overall item.

Special Member Inspection frequencies are as follows:

1. Structures with an overall condition rating of 4 in any one of the items 58, 59, 60, 62 shall be inspected at regular intervals not to exceed 12 months;

2. Structures with an overall condition rating of 3 in any one of the items 58, 59, 60, 62 shall be inspected at regular intervals not to exceed 6 months.

3.2.5 Underwater Special Member Inspection

Underwater Special Member Inspections are performed for the same reasons as stated in Subsection 3.2.4 and shall follow the same frequency policy. These Underwater Special Member Inspections are performed only when the structural component under the water is controlling the overall condition.

3.2.6 Closed Bridge Inspection

Closed Bridge Inspections document that the structure has been properly closed to vehicles and pedestrians when required. These Closed Bridge Inspections shall also include evaluation of the portion of the structure that is officially open to pedestrian traffic.

All closed bridges in the NBIS inventory, shall have a closed bridge inspection at a frequency not to exceed twenty-four months.

The DBIE may assign a more frequent inspection interval to ensure public safety. The frequency of a closed bridge may be increased due to the following:

1. DBIE's knowledge of the bridge;

2. Structure is open to pedestrians;

3. Structural element deterioration conditions could affect the use or public safety of individuals that use the facility underneath the structure.

If a structure has been closed to traffic for 5 years with no active project in place for repairs or replacement in the foreseeable future, the structure may be removed from the NBI and moved to the Non-NBIS Inventory. Coding for Item 8 shall be in accordance with Section 9.5.

Prior to the removal of the structure from the inventory, the District shall contact the owner of the structure to confirm that there are no plans anticipated for repairs or replacement. A letter to the owner of the structure shall be sent out stating that all future inspections will be the owner's responsibility. See Attachment 3-1 for a sample letter for a town owned structure.

3.2.7 Freeze/Thaw Bridge Inspection

Freeze/Thaw Bridge Inspections shall be performed yearly with the assistance of the District Maintenance Units. The Freeze/Thaw Inspections begin in the month of April and evaluate the condition of the exposed concrete elements primarily within the travel way. Refer to Section 8.7 for further information.

3.3 BRIDGE INSPECTION WAIVERS

The Federal Highway Administration (FHWA) does allow, with prior approval, for the inspection frequency interval to be extended from a maximum of twenty-four months to forty-eight months.

All requests for bridge inspection waivers are to be submitted to the Bridge Inspection Engineer for consideration. The Districts shall keep in mind that all extended frequencies must be approved by the

State Bridge Engineer and FHWA. Documentation submitted by the District for a waiver request shall conform to the guidelines for obtaining approval contained in the FHWA Technical Advisory - Revisions to the National Bridge Inspection Standards (NBIS), T5140.21.

3.4 BRIDGE INSPECTION SCHEDULING

The DBIE should utilize the 4D scheduling application and stored quick reports to produce lists of inspections to be performed in any given month. The reports also provide the names of previous team leaders who performed the last inspection.

Each DBIE will assign the bridges to be inspected in any given month to the available team leaders (TL's). The DBIE must attempt to evenly distribute the bridges to the TL's available while attempting to ensure that a TL has not inspected the bridge in its previous Routine Inspection.

It should be noted that the TL may inspect a given bridge on successive Special Member Inspections until the next Routine Inspection is due.

If the number and/or complexity of the bridges to be inspected exceed the capabilities of the DBIE's in-house staff, then the DBIE shall request consultant assistance by completing and submitting a Consultant Inspection Request Form, see Attachment 3-2, which is generated using 4D. The Consultant Inspection Request Form shall be submitted to the ABIE and the BIE for review and concurrence. Consultant Inspection Request Forms should be submitted to the BIE no later than the 15th of the month for inspections to be assigned for the following month.

Consultant Inspection Requests to be performed over active railroads must be submitted six months prior to their scheduled inspection date. This will allow for the time needed to obtain the necessary access permits.

Complex bridges that require assignment to consultants on a regular schedule are identified in 4D. Structures that are on the complex bridge inspection list are assigned by the BIE on a semi-yearly or quarterly basis, depending on the desired lead time. Consultant Request Forms for Complex Bridge Inspections are not required. The DBIE can request that a structure be considered for inclusion on the complex bridge inspection list by submitting their requests, with supporting documentation, to the ABIE and BIE for consideration.

3.5 OUT OF FREQUENCY

MassDOT strives for ZERO Out of Frequency (OOF). Bridge inspections MUST be completed during the month in which the inspection is due. The due month is determined by the date of the previous inspection and the frequency for the inspection type and condition ratings. Inspection types and associated frequencies are well documented herein. This requirement for zero OOF cannot be overstressed. All DOT's are evaluated yearly by the FHWA and frequency compliance is a critical metric.

If a bridge or portion thereof cannot be accessed in order to complete an inspection during the month that it is due, the TL shall conduct as much of the inspection that is possible and complete an inspection report depicting the areas and elements inspected. For areas and components not accessible, a visual inspection from as close as possible should be done to ensure there are no obvious safety issues. The

report should also clearly indicate areas of the bridge that were not inspected and provide the reason. The TL should then return to the bridge to complete an "Other" inspection when access is granted and/or possible. The TL in coordination with the DBIE shall establish a frequency that shall be inputted in Item 92 to correspond to a time frame that would be required to revisit the structure to complete the "Other" Inspection. By placing a time frame on the frequency, this will ensure that the "Other" Inspection is undertaken and not forgotten because 4D shall cue the structure in the future month's scheduling.

If a bridge inspection cannot be completed in the month that it is due then the DBIE must notify the BIE. The correspondence should document the reason for the delay. FHWA requires that the documentation be placed in the Bridge Inspection History File.

3.5.1 Out of Frequency Checks

Out of Frequency (OOF) checks shall be performed on a regular scheduled basis in order to monitor compliance with NBIS standards. The DBIE is responsible for compliance of the in-house inspections performed and the inspections performed by Consultant Teams.

Area Bridge Inspection Engineers (ABIE) shall monitor inspection frequency compliance within the Districts for which they have oversight responsibility. On or about the first of each month the ABIE should run an Out of Frequency (OOF) check within 4D for his/her Districts with a 1 month leeway.
For any bridges that appear on the OOF list, the ABIE should discuss the status of the required inspection with the DBIE. Once the status of the inspections has been confirmed then the documentation can be submitted. All documentation may be encompassed in an email format and shall include the reasons why the structure fell out of frequency. This documentation shall be provided to the ABIE and BIE as soon as the DBIE is aware of the structure being OOF.

3.6 INSPECTION COORDINATION

3.6.1 Police Details for Bridge Inspection

The purpose of this Subsection is to instruct Bridge Inspection Unit personnel on how, when to assign, and pay for Police Detail Services required during bridge inspections. A Police Detail Support Bridge is any bridge where a police detail is needed to insure the safety of either the Inspection Team or the Traveling Public. Examples of such bridges include bridges over high speed roadways, high traffic volume roadways, roadways with high truck percentages or other roadways where the presence of an inspection set up would have negative impact on the safety of the roadway traffic.

3.6.1.1 Procedures on Obtaining Police Details

The necessity of Police Detail Services will be determined by the District Bridge Inspection Engineer or his/her designee. When a bridge has been defined as a Police Detail Support Bridge, the District Bridge Inspection Engineer shall insure that the Bridge Inventory records are coded as such.

3.6.1.2 Scheduling Police Details

When a Police Detail Support Bridge is due for inspection, the Team Leader shall request authorization for Police Detail Services from the District Bridge Inspection Engineer or his/her designee in advance so that the frequency of inspection will be maintained.

When requesting a Police Detail, the individual ordering the detail shall ensure that their name is placed on the Police invoice. Also, it shall be stated to the City or Town that MassDOT has a policy of not paying for police cruisers or administrative expenses unless the fees are preapproved by MassDOT. Furthermore, the Police invoice shall be sent to the District Office, and not to the Satellite Bridge Inspection office for processing.

If a Police Detail Service is consistently unresponsive to providing scheduled Police Details, causing the Bridge Inspection Unit to fall out of frequency, the District Bridge Inspection Engineer shall immediately notify the District Bridge Engineer, Area Bridge Inspection Engineer and Bridge Inspection Engineer. A record of this Police Detail Service non-performance infraction shall be kept by the District Bridge Inspection Engineer.

3.6.1.3 Payment of Police Details

The Team Leader will complete the Police Detail form in the field, see Attachment 3-3, and return it to the District Bridge Inspection Engineer who will forward a copy to the Boston Bridge Inspection Unit.

When a Police Detail Service invoice is received, the District Bridge Inspection Engineer shall verify that the invoice is for the police protection requested by the Bridge Inspection Unit. The invoice shall be marked ("OK TO PAY") by the District Bridge Inspection Engineer and forwarded to the Boston office thereby recommending signature by the State Bridge Engineer.

If an invoice received includes various Bridge Inspection Police Detail Services, the DBIE shall attach a copy of all the Police Detail forms to the invoice and submit them to the Boston Office. Invoices submitted that were not authorized by the District Bridge Inspection Engineer will not be approved for payment. All unauthorized invoices should be forwarded to the Bridge Inspection Engineer, with a copy held by the DBIE.

3.6.1.4 Records of Police Details

The District Bridge Inspection Engineer shall insure that Police Detail Service support documents are filed in a separate folder. A copy of all infraction documentation shall be forwarded to the State Bridge Engineer.

The District Bridge Inspection Engineer shall keep accurate files for Police Detail Support Bridges, infractions and invoices. The files shall be kept in such a manner that a report of the costs can be readily made annually.

3.6.2 Railroad Flagging Services for Bridge Inspection

The purpose of this Subsection is to instruct Bridge Inspection Unit personnel on how, when to assign, and pay for Railroad Flagging Services. A Railroad Flagging Support Bridge is any bridge over a railroad with active tracks where flagging service is needed. There are Agreements in place for the various Railroad companies in Massachusetts (i.e. PanAm, CSX, MBTA, BAY COLONY, etc.)

3.6.2.1 Procedures on Obtaining Railroad Flaggers

The necessity of Railroad Flagging Services will be determined by the District Bridge Inspection Engineer or his/her designee. When a bridge has been defined as a Railroad Flagging Support Bridge, the District Bridge Inspection Engineer shall insure that the Bridge Inventory records are coded as such.

3.6.2.2 Scheduling Railroad Flaggers

When a Railroad Flagging Support Bridge is due for inspection over the tracks, the District Bridge Inspection Engineer or his/her designee shall schedule, in advance, requests for Flagging Services so that the frequency of inspection will be maintained. The District Bridge Inspection Engineer or his/her designee shall:

1. Determine status (ownership) of the right-of-way involved with the bridge. See Attachment 3-4, Brief History of Railroads in Massachusetts.

2. Establish the type of inspection required, type of equipment that is going to be used, and how it will affect the railroad's operation.

3. Contact the appropriate railroad to schedule a flagman.

4. Inform railroad contact of the following:

    - Bridge inspection for MassDOT (by what consultant if appropriate)
    - Type of inspection required
    - Location of bridge to be inspected by town, road name, and railroad milepoint (if available)
    - Date and time you would like to perform inspection
    - Number of hours (days) your inspection will take
    - Method of reimbursement to railroad if bridge is not a Chapter 634 transfer

5. Confirm date(s) of inspection, bridge to be inspected, time and meeting place for flag person.

In the event the railroad will not provide a flag person within a reasonable time, the DBIE shall keep a record of refusal indicating the name of the railroad company, contact person who refused to provide a flag person, date and the reason for refusal.

3.6.2.3 Payment of Railroad Flaggers

The Team Leader will complete the Flagging Service form in the field, see Attachment 3-5, and return it to the District Bridge Inspection Engineer, who will forward it to the Boston Bridge Inspection Unit.

When a Railroad Flagging Service invoice is received, the District Bridge Inspection Engineer shall verify that the invoice is for the flag protection requested by the Bridge Inspection Unit. The invoice shall be initialed by the District Bridge Inspection Engineer thereby recommending signature by the State Bridge Engineer, and forwarded to the Boston office.

NOTE: If the invoice received includes various Bridge Inspection Flagging Services, the DBIE shall attach a copy of all the Flagging Service forms to the invoice and submit them to the Boston Office.

Invoices submitted that were not authorized by the District Bridge Inspection Engineer will not be approved for payment. All unauthorized invoices should be forwarded to the Bridge Inspection Engineer, with a copy held by the DBIE.

3.6.2.4 Records of Railroad Flaggers

The District Bridge Inspection Engineer shall insure that Railroad Flagging Service support documents are filed in a separate folder. A copy of all infraction documentation shall be forwarded to the State Bridge Engineer.

The District Bridge Inspection Engineer shall keep accurate files for Railroad Flagging Support Bridges, infractions and invoices. The files shall be kept in such a manner that a report of the costs can be readily made annually.

3.6.3 Traffic Management Services for Bridge Inspection

The purpose of this Subsection is to instruct Bridge Inspection Unit personnel on how, when to assign, and pay for Traffic Management Services. A Traffic Management Bridge is any bridge over a roadway that would require traffic safety setup to ensure the safety of the inspection team and the safety of the traveling public.

3.6.3.1 Procedures on Obtaining Traffic Management Services

The necessity of Traffic Management Services will be determined by the District Bridge Inspection Engineer or his/her designee. When a bridge has been defined as a bridge requiring a traffic safety setup, the District Bridge Inspection Engineer shall insure that the Bridge Inventory records are coded as such.

The District Bridge Inspection Engineer or his/her designee shall follow the procedures outlined in the Roadway Work Notification memorandum dated December 18, 2009, see Attachment 3-6 and Attachment 3-7 when obtaining traffic management services.

The District Bridge Inspection Engineer or his/her designee shall prepare the Roadway Work Notification Form, see Attachment 3-8, and enter the form into the Event Reporting System (ERS).

3.6.4 Navigable Waterway Inspection Coordination

For inspections that are to be performed on or over navigable waterways all local interested parties should be informed as appropriate for the site. Advance coordination may be required from: Massachusetts Department of Conservation and Recreation; U.S. Coast Guard; Massachusetts State Police Marine Unit; Local Harbormasters, etc. Note: this includes above water inspections as well as dive inspections.

3.7 FIELD INSPECTION NOTIFICATION PROCEDURES

On occasion, it is important that the District Bridge Engineer, BIE and DBIE be cognizant of each inspection team's field inspection locations on any giving day in the event an inquiry is made or when an emergency may arise that would require the dispatching of an inspection team to address the situation.

3.7.1 Daily Field Inspection Notification

It is important that the DBIE be cognizant of each inspection team's field inspection locations. A system shall be established in each district bridge inspection office to indicate daily field inspection locations for each team's actively inspecting structures. If for any reason a planned inspection cannot be performed and the team moves to an alternate location, the team leader shall so notify the DBIE and or his designee.

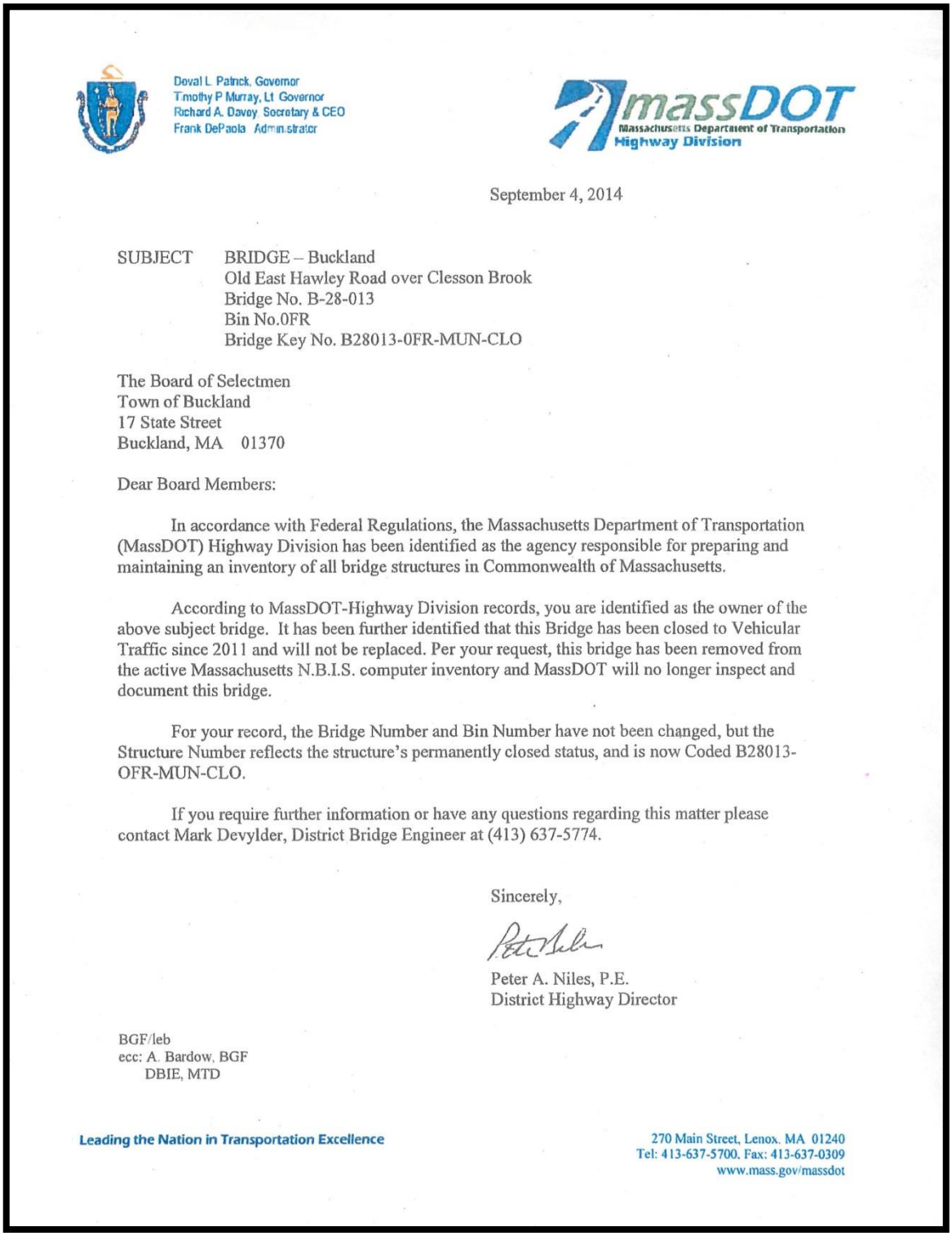
3.7.2 Consultant Field Inspection Notification

Inspection consultants are required to inform the DBIE, ABIE and BIE of their scheduled field inspection activities with a MassDOT Field Inspection Notification Form, see Attachment 3-9. This notification is to be made via email the day prior to the planned inspection. For multiple day inspections the form should be submitted for each day in the field. It is also helpful if the last day of the field work would be indicated on the form by adding Inspection Completed as the status.

3.7.3 Dive Inspection Notification

For certain underwater inspections such as at critical bridges, signature bridges, and major waterways or at highly visible locations the U/W Operations Engineer or his designee should notify the BIE of the planned dive. This should be done via email or a phone call no later than the morning of the planned dive inspection.

3.8 CHAPTER 3 ATTACHMENTS



Deval L. Patrick, Governor
Timothy P Murray, Lt Governor
Richard A. Davey, Secretary & CEO
Frank DePaola, Administrator

MassDOT
Massachusetts Department of Transportation
Highway Division

September 4, 2014

SUBJECT BRIDGE – Buckland
Old East Hawley Road over Clesson Brook
Bridge No. B-28-013
Bin No.0FR
Bridge Key No. B28013-0FR-MUN-CLO

The Board of Selectmen
Town of Buckland
17 State Street
Buckland, MA 01370

Dear Board Members:

In accordance with Federal Regulations, the Massachusetts Department of Transportation (MassDOT) Highway Division has been identified as the agency responsible for preparing and maintaining an inventory of all bridge structures in Commonwealth of Massachusetts.

According to MassDOT-Highway Division records, you are identified as the owner of the above subject bridge. It has been further identified that this Bridge has been closed to Vehicular Traffic since 2011 and will not be replaced. Per your request, this bridge has been removed from the active Massachusetts N.B.I.S. computer inventory and MassDOT will no longer inspect and document this bridge.

For your record, the Bridge Number and Bin Number have not been changed, but the Structure Number reflects the structure's permanently closed status, and is now Coded B28013-OFR-MUN-CLO.

If you require further information or have any questions regarding this matter please contact Mark Devylder, District Bridge Engineer at (413) 637-5774.

Sincerely,

Peter A. Niles, P.E.
District Highway Director

BGF/leb
ecc: A. Bardow, BGF
DBIE, MTD

Leading the Nation in Transportation Excellence

270 Main Street, Lenox, MA 01240
Tel: 413-637-5700, Fax: 413-637-0309
www.mass.gov/massdot

Attachment 3-1: Sample Letter of Municipally Owned Structure Removed from NBI Inventory

REQUEST FOR CONSULTANT BRIDGE INSPECTION

To be filled out by the DBIE:

District: Town:

Bridge No: Struct No: BIN:

Facility Carried (1-7): Feature Intersected (1-6):

Type of Inspection requested:

☐ Routine	Due Date:_____	Team Hours Needed* _____
☐ Special Member	Due Date:_____	Team Hours Needed* _____
☐ Fracture Critical	Due Date:_____	Team Hours Needed* _____
☐ Other (Please explain)	Due Date:_____	Team Hours Needed* _____

* Based on your knowledge of this structure and structure's condition determine the number of Team Hours Needed to inspect this bridge. This number shall include all preparation time for inspection, travel time from District Office, actual inspection and preparations of the reports.

Special equipment and requirements for this inspection [i.e. Inspection-50 (Bridge Master), Rigging, Police, RR Flag Person, and etc.]: _____

Remarks:

DBIE's Signature: Date of submission to Area Engineer:

Please attach a copy of the latest SI&A.

To be filled out by the Area Engineer:

☐ I agree with the above request from the DBIE

☐ I do not agree with the above request from the DBIE, because: _____

Area Engineer's Signature: Date of submission to BIE:

To be filled out by the Bridge Inspection Engineer:

☐ Assign ☐ Do not assign, because: _____

☐ Returned it to the District because: _____

Bridge Inspection Engineer's Signature: Date of submission to NBIS CCE:

Consultant:

Contract No:

Assignment No:

Date of letter requesting fee proposal:

Remarks:

Attachment 3-2: Request for Consultant Bridge Inspection Form

POLICE DETAIL FORM

Massachusetts Department of Transportation
Bridge Inspection Unit

District: _____ District Address: _____

Town: _____ Bridge No./BIN No.: _____

Bridge Location: _____

Meeting Location: _____

Date of Service: _____ From: _____AM/PM To: _____AM/PM

Print
Officer No. 1's Name: _____Badge No.: _____

Print
Officer No. 2's Name: _____Badge No.: _____

State Police: ☐ Town Police: ☐

Officer's Work Address:_____ Officers Work Telephone No.

_____ _____

_____ _____
Officer No. 1's Signature Officer No. 2's Signature

_____ _____
Team Leader's Signature Date

Attachment 3-3: Police Detail Form

BRIEF HISTORY OF RAILROADS OPERATING IN MASSACHUSETTS

Massachusetts is currently served by eleven operating freight railroad companies, one operating passenger railroad company, and one commuter rail agency.

CSX TRANSPORTATION, INC. (CSXT)

CSX ownership of all lines in Massachusetts formerly owned by the Consolidated Rail Corporation (CONRAIL) dates back to the takeover and division of the CONRAIL system by CSX and the Norfolk Southern Railroad (NS), approved by the Surface Transportation Board (STB) effective August 22, 1998. After a transitional period, CSX began full operation of the former CONRAIL lines on June 1, 1999.

As of October 2, 2012, CSX completed the sale and transfer of the Boston to Worcester portion of the Boston Subdivision mainline, the Grand Junction Railroad between Boston and Somerville and its lines in Southeastern Massachusetts to Fall River and New Bedford to the Massachusetts Department of Transportation. These lines will be administered for MassDOT by the MBTA.

CONRAIL had been established under the Regional Rail Reorganization Act of 1973 for the purpose of acquiring certain lines of bankrupt railroad companies in the Northeast and Midwest. CONRAIL commenced operations on April 1, 1976. In Massachusetts, all lines taken over by CONRAIL had been operated by the Penn Central Transportation Company prior to April 1, 1976. The Penn Central System in Massachusetts was made up of former routes of the New York Central Railroad and the New York, New Haven and Hartford Railroad.

The Penn Central Railroad was created by the merger of the New York Central and the Pennsylvania Railroads on February 1, 1968. All New York Central lines in Massachusetts were once part of the Boston and Albany Railroad. The New York, New Haven and Hartford Railroad (NYNH&H) was merged into the Penn Central on January 1, 1969. The NYNH&H system was formed through a series of mergers of numerous smaller companies but most of its lines in Massachusetts were once part of the Old Colony Railroad, the Boston and Providence Railroad, and the New England Railroad.

CSX itself was formed through the merger of the Chessie and Seaboard railroad systems in 1983. These systems had been formed through the consolidation of various railroads serving Southeastern and Midwestern United States dating back to the 1960's. The chief components included the Chesapeake and Ohio Railroad, the Baltimore and Ohio Railroad, the Louisville and Nashville Railroad, the Atlantic Coast Line and the Seaboard System.

BOSTON AND MAINE RAILROAD (B&M RR)

Presently, the Boston & Maine Railroad is a wholly owned subsidiary of Pan Am Railways, Inc. (PAR), prior to March 2006 known as Guilford Rail System (GRS). Pan Am Railways is itself a subsidiary of Pan Am Systems, formerly known as Guilford Transportation Industries (GTI). Guilford bought the name, colors and logo of Pan American World Airways in 1998.

In October 1981, GTI applied to the Intestate Commerce Commission for authority to control the Boston & Maine Corporation, then in bankruptcy. This transaction, completed in June 1983, gave GTI complete stock ownership of the Boston & Maine Railroad. On January 1, 1984, GTI purchased control of the B&M's subsidiary, the Springfield Terminal Railway. While the B&M Railroad is the official corporate owner of the railroad right of way, the actual train operations are leased out to the Springfield Terminal Railway, PAR's operating subsidiary.

The system operated by the Boston & Maine Railroad was formed through a series of mergers of smaller companies. Most B&M lines in Massachusetts were once part of the Eastern Railroad, the Boston and Lowell

Railroad, the Fitchburg Railroad, and the Connecticut River Railroad.

On May 15, 2008, Norfolk Southern Corp. reached agreement with Pan Am Railways to create a joint rail route between Albany, NY and the eastern Massachusetts to be called the "Patriot Corridor". The Surface Transportation Board approved this deal on March 12, 2009. Each of the two companies own 50% of a new company known as Pan Am Southern (PAS). PAR's trackage between Ayer, MA and Mechanicville, NY was transferred to PAS but continues to be operated and maintained by PAR's Springfield Terminal Railway subsidiary.

NEW ENGLAND CENTRAL RAILROAD (NECR)
The New England Central Railroad was formed by Railtex Corp. of San Antonio, Texas, when it purchased the Central Vermont Railway (CV) from its previous owner, Canadian National. NECR took over railroad operations of the former CV on February 4, 1995. The NECR main line between Connecticut and Vermont runs through Massachusetts from the Connecticut line at Monson to the Vermont line at East Northfield, a distance of 55 miles. The NECR has no other lines in Massachusetts except for industrial and yard tracks.

HOUSATONIC RAILROAD (HRR)
The Housatonic Railroad began as a passenger excursion railroad in 1985 in the state of Connecticut, operating on an abandoned portion of the former Penn Central, nee NYNH&H, Berkshire Line between Canaan and Cornwall Bridge, CT. Later, after it branched into freight operations, the Housatonic purchased the Massachusetts portion of the Berkshire Line, between Pittsfield and Canaan, CT, just over the Connecticut line from Sheffield, from Guilford Transportation Industries in January 1991. Presently, the Housatonic is exclusively a freight railroad reaching from Pittsfield as far south as Danbury, CT. It has no other lines in Massachusetts except for industrial spur tracks.

BAY COLONY RAILROAD CORPORATION (BCL RR)
The Bay Colony Railroad Corporation (Bay Colony) was chartered on March 31, 1977, with the intent of taking over freight service on former New Haven lines in Southeastern Massachusetts from CONRAIL, which was planning to abandon service. The Commonwealth of Massachusetts subsequently purchased these lines and Bay Colony took over all freight operations on them on June 12, 1982 with a 25-year contract. This contract, administered by the Massachusetts Executive Office of Transportation (predecessor of the MassDOT), expired on December 31, 2007. The contract for freight operations on the MassDOT owned lines on Cape Cod and Southeastern Massachusetts was awarded to a new company, the Massachusetts Coastal Railroad, which took over on January 1, 2008. At that time the Bay Colony ceased operation on those lines, but continues to provide freight operations on the line from Medfield Junction to Newton Upper Falls.

MASSACHUSETTS COASTAL RAILROAD (MAC RR)
The Massachusetts Coastal Railroad is a subsidiary of Cape Rail Inc., which also operates the Cape Cod Central Railroad, an excursion and dinner train operator between Hyannis and Buzzards Bay. Mass Coastal was awarded the contract to be the freight operator of MassDOT owned rail line on Cape Cod as well as some others in Southeastern Massachusetts that were formerly operated by the Bay Colony Railroad. This contract took effect on January 1, 2008.

PROVIDENCE AND WORCESTER RAILROAD COMPANY (P&W RR)
The Providence and Worcester Railroad was originally incorporated separately in Rhode Island and Massachusetts in 1844. The Massachusetts Corporation was merged into the Rhode Island Corporation in 1845. The Company's main line between Providence and Worcester was opened in 1847.

On July 1, 1892, the New York, New Haven and Hartford Railroad leased the P&W for 99 years. The New

Haven itself merged into the Penn Central Railroad on January 1, 1969. On April 6, 1970 the P&W announced its intention to separate from the merger. After a legal battle, the Interstate Commerce Commission approved the request on August 25, 1972, and on November 2, Penn Central signed the agreement effective December 30. The P&W cancelled the lease on February 3, 1973.

The P&W's trackage expanded in 1974, when the P&W reopened the B&M' s former Peterborough Branch between Worcester and Gardner, which the B&M had abandoned in 1972. The second expansion was in 1976, when the USRA transferred the former Norwich & Worcester Railroad, including a branch to Southbridge, from the Penn Central to the P&W. In Massachusetts, this trackage extends from Worcester to the Connecticut line in Webster. The branch to Southbridge was subsequently abandoned in 2004.

PIONEER VALLEY RAILWAY COMPANY (PVRR)
The Pioneer Valley Railway Company, a subsidiary of the Pinsly Railroad Company, was organized in 1982 for the purpose of acquiring the CONRAIL Holyoke and Florence Secondary lines. At the time of the purchase, the Florence Secondary had been abandoned from Florence to Easthampton since 1969. The PV also took over operations on the Boston & Maine Corporation's 3.3 mile Easthampton Branch in Easthampton in 1982, but by 1995, the line was no longer in service and it was officially abandoned in 1998.

MASSACHUSETTS CENTRAL RAILROAD CORPORATION (MCRR)
The Massachusetts Central Railroad was incorporated December 16, 1975 and started limited operations on a few miles of former Boston & Maine trackage in and around the Ware Yard. In 1976, the Commonwealth of Massachusetts awarded the Mass Central a contract to provide freight operations on the portion of the former Ware River Railroad that the state had purchased from CONRAIL. Mass Central currently provides freight operations on the 26 mile line from Palmer to South Barre.

GRAFTON AND UPTON RAILROAD COMPANY (G&U RR)
The Grafton and Upton Railroad Company was incorporated in October 1873 as the Grafton Center Railroad; the present name was adopted in February 1888. Today the G&U owns a 15.4 mile route between the CSX Boston Subdivision main line at North Grafton and the CSX Milford secondary track at Milford. Currently, the track between Milford and West Upton is out of service, however, as of 2012, there are plans to restore service to this stretch of track as well.

THE FORE RIVER RAILROAD (FRR)
The shortest common-carrier railroad in Massachusetts is the 2.4 mile Fore River Railroad (FRR). It was originally built by Thomas Watson, Alexander Graham Bell's assistant in the invention of the telephone, in 1903 as a private railroad to serve his shipyard at Quincy Point on the Fore River. The railroad company was incorporated on January 6, 1919, only after the Bethlehem Steel Corporation bought the shipyard and railroad. The railroad has always been under the same ownership as the shipyard. In 1987, the Massachusetts Water Resources Authority (MWRA) purchased the shipyard property, including the FRR, in order to construct a major sewage sludge processing facility on the site. As of July 1, 2001, the FRR is being operated under contract to the MWRA by Fore River Transportation, a division of Twin Rivers Technologies which is the railroad's largest customer.

NATIONAL RAILROAD PASSENGER CORPORATION (AMTRAK)
The National Railroad Passenger Corporation (AMTRAK) was established by Congress in 1971 to operate a nationwide network of inter city passenger trains. AMTRAK currently provides inter city passenger trains between Boston and Worcester, Springfield, Pittsfield and Chicago and between Boston, Providence, New Haven, New York, Philadelphia, and Washington. In Massachusetts, AMTRAK owns trackage along the Connecticut River between the Connecticut border and the Springfield railroad station. Elsewhere, AMTRAK

operates by trackage rights on other railroads. In 2000, the AMTRAK electrified the Northeast Corridor, which in Massachusetts includes the MBTA Providence Line from Boston to the Rhode Island border, and since that date all intercity passenger service provided by AMTRAK on the Northeast Corridor has been with electric locomotives.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY (MBTA)

The Massachusetts Bay Transportation Authority (MBTA) was created in 1964. At that time, the discontinuance of most remaining railroad commuter service in Massachusetts was imminent due to the bankruptcy or near bankruptcy of the railroad operating commuter service.

All commuter rail service to and from Boston is operated under the auspices of the MBTA. With the sale of the CSX Boston Subdivision mainline from Boston to Worcester, all routes over which service is provided are also owned by the MBTA. As of July 1, 2014, the MBTA has contracted with Keolis Commuter Services to operate all Boston commuter railroad services. Previously, the Massachusetts Bay Commuter Railroad Co. operated all MBTA commuter rail service under a contract that started July 1, 2003, succeeding AMTRAK, who had operated those services starting January 1, 1987, and prior to that, for over ten years, the Boston and Maine Corporation had been the sole contract operator of this service.

FLAGGING SERVICE FORM

Massachusetts Department of Transportation
Bridge Inspection Unit

District: _____ District Address: _____

Town: _____ Bridge No./BIN No.: _____

Bridge Location: _____

Meeting Location: _____

Date of Service: _____ From: _____AM/PM To: _____AM/PM

Print
Railroad Company: _____

Print
Flag Person's Name: _____

Print
Flag Person Supervisor's Name: _____

Print
Flag Person's Work Address: _____

_____ _____ _____
Flag Person's Signature Team Leader's Signature Date

To Be Filled out by DBIE

The above bridge is under Chapter 634 and therefore Flagging Services are free of charge (Y / N)

Invoice for the above work received on:_____

Invoice No.:_____

Submitted to Boston Office on: _____

DBIE's Signature:_____

Attachment 3-5: Railroad Flagging Service Form

Massachusetts Department of Transportation
Highway Division
Interoffice Memorandum

To: All District Highway Directors and Deputy Chief Engineers

From: Frank A. Tramontozzi, P.E., Chief Engineer

Date: December 18, 2009

Subject: **New Roadway Work Notification Form**

Effective immediately, the MassDOT Highway Division will use a single Roadway Work Notification Form to collect information regarding planned work activities on all significant state highways, as identified in the attached guidance document. Former Turnpike Authority employees have already been using this new form since August 2009.

The attached guidance document describes employee responsibilities including submittal and approval procedures, and contains detailed instructions for completing the forms. All approved forms shall be submitted to the MassDOT Highway Operations Center and to Smart Routes for entry into the Event Reporting System (ERS).

This process will allow us to internally access ERS to view all planned surface roadway activity for each coming week. The process will also allow Smart Routes to use the information to develop electronic feeds to different media outlets and will provide the MassDOT Communications and Public Affairs office with key information regarding our road and bridge system.

As MassHighway and Turnpike Authority operations become more integrated, some of these new procedures may be modified to reflect our evolving organizational structure. In the meantime, please follow these procedures to achieve a consistent method of collecting roadway work information throughout MassDOT.

Thank you for your cooperation regarding this initiative.

Attachments: Roadway Work Notification Form
Roadway Work Notification Procedures

Attachment 3-6: 12-18-09 IOM NEW ROADAY NOTIFICATION FORM

Massachusetts Department of Transportation
Highway Division

Roadway Work Notification Procedures

This guidance document describes the procedures that MassDOT Highway Division employees shall follow for approving and submitting information pertaining to scheduled work or planned activities on or along designated roadways. Effective immediately, all MassDOT Highway Division employees are required to submit Roadway Work Notification Forms and comply with the following procedures for all scheduled work or planned activities on or along designated roadways.

General

The following requirements shall apply to all roadways and associated ramps that are listed near the end of this document.

All MassDOT Highway Division employees and designated consultant bridge inspectors who are responsible for supervising, coordinating or performing construction work, maintenance activities, bridge inspection, permit projects or other planned events shall prepare a Roadway Work Notification Form for review and approval.

Each Roadway Work Notification Form shall include all required information. The duration of work approvals shall be limited to one week at a time. If the work exceeds one week then a new Roadway Work Notification Form is required to be submitted for each additional week.

Approval

For Activities on Former MassHighway Facilities

All Roadway Work Notification Forms must be submitted to the District office in which the work will occur. The District Highway Director will designate approval authority to at least three people. Notifications regarding bridge inspection, including consultant inspections, must also be submitted to the District office for approval.

Planned closures of any of the listed roadways or ramps must be approved directly by the District Highway Director.

For Activities on Former Turnpike Authority Facilities

All construction and permit work shall be approved by the Western Turnpike Division Engineer's Office.

All maintenance and internal work shall be approved by the Western Turnpike Division Maintenance Office.

Attachment 3-7: Roadway Work Notification Procedures, Page 1 of 4

Submission

Designated personnel from each District or Turnpike office shall submit approved forms to the Highway Operations Center (HOC) and Smart Routes. A scan of the form submitted by e-mail is the preferred method of notification, however faxes will be accepted. All forms must contain the required information and have the proper signatory approval. Forms must be submitted no later than 3:00 PM on the Thursday prior to the week the work will begin. All approved work request forms shall be submitted to both of the following locations:

MassDOT Highway Operations Center

E-mail: toc@massters.com
Fax: 617-310-4799, or 617-310-4789
Telephone: 617-310-4700, or 800-227-0608

Smart Route Systems

E-mail: 511toc@smartraveler.com
Fax: 617-494-5271
Telephone: 617-494-5200

The HOC staff will review each form as it is received and will enter the information from all MassHighway and MassTurnpike forms as soon as possible, but no later than 24 hours from receipt. If the information is incomplete or needs clarification, the HOC staff will notify the approving authority from the District/Turnpike office to resolve any issues. Roadway Work Notification Forms not entered into the Event Reporting System (ERS) within 24 hours shall be given to the HOC Shift Supervisor on duty for review and resolution.

Confirmation of Daily Work

Every day, prior to the beginning of any work, changes in a work zone location or changes in lane configuration, the Contact Person shall call the HOC to confirm the planned work or activity. The Contact Person and HOC staff will coordinate to activate available variable message signs (VMS) to support the work. If HOC staff has not received a confirmation call within one hour of the planned work, HOC staff shall call the Contact Person to confirm. VMSs will not be activated until the work is confirmed for the scheduled period. To avoid conflicting roadway messages within the work zone, contact to the HOC is required even if the Contractor is using their own message boards.

The Contact Person is also required to call the HOC at the completion of work each day and to notify the HOC if the work has been canceled due to scheduling or weather conditions.

Attachment 3-7: Roadway Work Notification Procedures, Page 2 of 4

Required Information and Instructions

Date and Time: Enter the date and time when the work or event will begin and end. The start and end time will be based on the placement or removal of traffic control devices or the beginning of actual work for the approved activity, whichever is the earliest or latest time.

Work or Event Type: Chose the type of work or event that is proposed. If the work is a construction project include the contract number. If the work is a permit project include the permit number. If choosing "Other" include a one or two word description.

District/Region: Enter the MassHighway District or Masspike Region where the work or event will occur.

City/Town: Enter the city or town where the work or event will take place. If the work occurs in two or more municipalities, enter them in the order in which traffic will flow through the project. Ex.: north to south or east to west.

Roadway: Enter the route number and/or street name where the work will take place.

Direction: Indicate the direction of traffic flow along the roadway that the work will take place.

From/To: Enter the beginning and ending work limits based on exit numbers or intersecting streets. If necessary include descriptions, such as "300 feet before Exit 15" or "400 feet after Oak Street". For activities on I-90, Mile Markers and Interchanges where the activity is between must be noted.

Bridge Number: Only enter information about a bridge if the work is specific to the bridge. For bridge inspection work, enter information about the roadway or roadways that will be impacted by the inspection. For example, if the inspection is performed from beneath the structure, include the information about the roadway beneath. If the inspection does not require any lane or shoulder restrictions, such as a bridge over water or a railroad being inspected from underneath, then no roadway work approval is required.

Ramp Closures: If ramp closures are required include the exit number and the roadways that are connected by the ramp. For example: "Exit 36, from I-93 north to I-95 north", or "Exit 22, from I-95 north to Main Street."

Brief Description of Work: Include a brief description of the proposed work including the approved work hours for the project. The description should focus on elements of work that will impact the flow of traffic. Avoid using engineering terms or local landmarks. For the purpose of this form, the material type of a bridge beam or a sidewalk is less important than the method of construction and how it will affect traffic. Construction staging and specific information about when lane closures will occur and in what sequence are very important. Use the second page of the form to explain construction stages or lane closure sequencing.

Attachment 3-7: Roadway Work Notification Procedures, Page 3 of 4

Existing Lanes: Use the letters S = Shoulder, L = Travel Lane and M= Median to illustrate the lane configuration of the roadway.

Lane Usage: Use the letters O = Open and X = Closed to show which lanes will be Open or Closed to traffic due to the proposed work.

Contact Person: Include the name of the MassDOT employee or the designated consultant bridge inspector in charge of the proposed work. Include the name of the person who will be on-site at the project if possible.

Radio ID: If available, include the state Radio ID of the person in charge of the work.

Telephone Numbers: Include the Contact Person's office and cellular telephone numbers.

Required Roadway Listing

Interstate Highways	Numbered Routes	
I-84	1	24
I-90 (excluding MHS)	1A	25
I-91	2	28
I-93 (excluding MHS)	3	57
I-95	3A	63
I-190	5	128
I-195	6	140
I-290	7	146
I-291	8	202
I-295	9	
I-391		
I-395		
I-495		

Information regarding other roadways can be submitted in addition to the above list. Events or activities on other roadways that have the potential to impact traffic flow along any of the listed roadways should also be submitted.

Event Reporting System (ERS) Access and Review

The information presented in the ERS is accessible through a web-based application at the following URL: http://www.masstraffic.us. A password and user name can be issued to all personnel who need access to the information. To obtain a user name and password please forward all requests to toc@massters.com.

All information will be made available to numerous media and traffic reporting companies through Smart Route Systems and the through the MassDOT Developers Page at the following URL: http://www.eot.state.ma.us/developers/.

Attachment 3-7: Roadway Work Notification Procedures, Page 4 of 4

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MASSACHUSETTS
Roadway Work Notification Form **Page: 1 of 1**

Start Date:_____ **Start Time:**_____ **End Date:**_____ **End Time:**_____

☐ Construction: No. _____ ☐ Bridge Inspection ☐ Maintenance Crew

☐ Permit Project: No. _____ ☐ Other: _____

District: _____ **City/Town:** _____

Roadway: _____ **Direction:** ○ NB ○ SB ○ EB ○ WB ○ OTHER

From: _____ *(Exit # or Intersecting Street)* **To:** _____ *(Exit # or Intersecting Street)*

Bridge No.: _____ _____ *(Roadway)* over _____ *(Roadway, Waterway, Railroad, Other)*

Ramp Closures:

Exit # _____ From, _____ (Roadway & Direction) To, _____ (Roadway & Direction)

Brief Description of Work: (Attach second sheet for multiple lane closures or additional information)

Existing Lanes	S = Shoulder L = Travel Lane M = Median							
Lane Usage	O = Open X = Closed							

Contact Person: _____ Radio ID: _____

Cell Phone: _____ Office Phone: _____

Recommended: _____ **Approved:** _____ **Date:** _____

TOC Fax No.:617 310-4789 or 617 310-4799 TOC Email: TOC@massters.com 511toc@smartraveler.com

Attachment 3-8: Roadway Work Notification Form, Page 1 of 2

Page 2 of 2

Phase One

District: _____ **City/Town:** _____

Roadway: _____ **Direction:** ○ NB ○ SB ○ EB ○ WB ○ OTHER

Brief Description of Work: (Attach second sheet for multiple lane closures or additional information)

Existing Lanes	S = Shoulder L = Travel Lane M = Median							
Lane Usage	O = Open X = Closed							

Phase Two

District: _____ **City/Town:** _____

Roadway: _____ **Direction:** ○ NB ○ SB ○ EB ○ WB ○ OTHER

Brief Description of Work: (Attach second sheet for multiple lane closures or additional information)

Existing Lanes	S = Shoulder L = Travel Lane M = Median							
Lane Usage	O = Open X = Closed							

TOC Fax No.:617 310-4789 or 617 310-4799 TOC Email: TOC@massters.com 511toc@smartraveler.com

Attachment 3-8: Roadway Work Notification Form, Page 2 of 2

MassDOT FIELD INSPECTION NOTIFICATION FORM

Email To: District Bridge Inspection Engineer/Bridge Inspection Engineer
Telephone # Telephone #
Email address email address

From: *Consultant Name*
Contract Person
Telephone No.

MassDOT Contract No./Assignment No. _____

Date:_____ Weather:_____

Team #1	Team #2
Bridge No./BIN:_____	Bridge No./BIN:_____
City/Town:_____	City/Town:_____
Item 7:_____	Item 7:_____
Item 6:_____	Item 6:_____
Crew: T.L. T.M. T.M.	Crew: T.L. T. M. T.M.
Equipment:_____	Equipment:_____
Lane Closure:_____	Lane Closure:_____
Comments:_____	Comments:_____
_____	_____

PREVIOUSLY DAY WORK REPORT

Date:_____ Weather:_____

Bridge No./BIN:_____	Bridge No./BIN:_____
City/Town:_____	City/Town:_____
Item 7:_____	Item 7:_____
Item 6:_____	Item 6:_____
Crew: T.L. T.M. T.M.	Crew: T.L. T.M. T.L.
Crew Time:_____	Crew Time:_____
Equipment:_____	Equipment:_____
Status:_____	Status:_____
_____	_____
_____	_____
_____	_____

Attachment 3-9: MassDOT Field Inspection Notification Form

CHAPTER 4
FIELD INSPECTION, DATA COLLECTING, REPORT WRITING AND REPORT REVIEW

4.1 INTRODUCTION

In this chapter, MassDOT policies and procedures for performing bridge inspections are presented. This chapter will also discuss conducting the field inspections, data collecting, report writing and report review. In addition, the policy for reporting and addressing "Critical" findings is outlined. As mentioned in Chapter 3, inspections performed in Massachusetts are "hands on", and all inspections are performed by NBIS qualified Team Leaders with the assistance of one or more team members.

Bridge inspections and inspection reports that are developed are essential for protecting lives and for protecting the public's investment in bridge structures. The Bridge Inspection Management System (4D) includes the reports that correctly and efficiently evaluate the condition of a structure. This information is also a valuable aid in establishing maintenance and replacement priorities. Finally, inspection reports are stored in 4D and are also used for determining a structure's load carrying capacity.

The information necessary to make these determinations must come largely from the bridge inspection reporting system. The importance of the reporting system cannot be over emphasized as the success of any bridge inspection program is dependent upon its reporting system. A new inspection report shall be created each time a bridge is inspected. To achieve maximum effectiveness, each report should be supplemented with sketches, photographs, or any other additional explanatory information. Reports and supplemental information must be accurate, and descriptions or explanations shall be clear and concise.

4.2 STANDARD INSPECTION REPORT FORMS

The standardization of the inspection forms is a necessary step for a uniform bridge inspection reporting system. Prior to performing inspections for MassDOT, one should be aware of the standard inspection report forms available in the 4D system. In Chapter 3, the types of inspections commonly performed were briefly explained. Standardized forms have been created to assist in the report preparation and review process. These forms also provide a uniform method for querying information pertaining to the elements and sub-elements of a structure for prioritization of maintenance repairs. The Standard Inspection Forms used are:

- Initial Inspection Report
- Routine Inspection Report
- Routine Arch Inspection Report
- Routine Culvert Inspection Report
- Routine Underwater Inspection Report
- Routine Segmental Box Girder Inspection Report*
- Other Inspection Report
- Routine Movable (Mechanical/Electrical) Inspection Report*
- Routine Closed Inspection Report
- Special Member Inspection Report
- Routine & Special Member Inspection Report

- Fracture Critical Inspection Report
- Damage Inspection Report
- Divers Activity Report
- Underwater Special Member Report
- Underwater Low Clearance Report
- Element Level Inspection Report (AASHTOWare Bridge Management)

* Not available in 4D.

4.3 SI&A SHEET

The Structure Inventory and Appraisal (SI&A) sheet is a tabulation of pertinent elements of information about an individual structure. It includes data that is required by the Federal Highway Administration (FHWA) to effectively monitor and manage the National Bridge Program. Such data is submitted annually to the FHWA and comprises the National Bridge Inventory database. The SI&A sheet also includes information specific to the needs of MassDOT.

There are three formats available on 4D for the SI&A sheet. The three formats are:

1. Inventory
2. For Inspection
3. MA Specific

The first two formats are very similar but have certain unique items. The "For Inspection" format includes accessibility information while the "Inventory" format includes projected future project costs. In most cases the "For Inspection" format should be used, which is the default format within 4D. The "MA Specific" format, as it suggests, is a collection of data utilized by MassDOT.

The SI&A sheet is not an inspection form but it is to be included with each inspection report submission. Bridge inspection personnel shall become familiar with all of the data items appearing on the SI&A sheet. Descriptions and explanations of the FHWA required data are provided in the FHWA's Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges. Massachusetts specific items are described in MassDOT's Supplemental Coding Guide included in Chapter 9.

Responsibility for the accuracy of the data appearing on the SI&A sheet is shared between the Boston Bridge Inspection Headquarters and the District Bridge Inspection Units. A clarification of which items are to be confirmed/revised and by who is provided in Chapter 9.

4.4 ELEMENT LEVEL INSPECTIONS

Element Level Bridge Inspection Data (ELBID) (formerly PONTIS Core Element Data) is to be collected and entered into the BIMS (4D) with every Routine Inspection. Also, when requested by the District Bridge Engineer to perform an inspection outside of the established frequency, for the documentation of repairs performed on the structure a revision to the ELBID shall be performed. A hard copy of the Element Level Data is to be attached to the inspection report. Please refer to the AASHTO Guide Manual for Bridge Element Inspection.

Bridge elements to be collected include National Bridge Elements, Bridge Management Elements and Agency Developed Elements as appropriate. Typically, quantities for each bridge element shall be calculated during the Initial Inspection. Ideally the quantities will be calculated from the as-built plans.

At each Routine Inspection, the Team Leader is to identify the quantity of each bridge element that can be categorized as being in each of the four condition states. Guidelines for the assessment of conditions for each condition state can be found in the AASHTO Guide Manual, see Attachment 4-1 for a quick reference guide for the Element Level Condition States.

For bridges that have an underwater inspection, the Team Leader is to also include Element Level Bridge Data collected by the Dive Team. At the time of publication of this Handbook, the underwater inspectors do not have the capability of inputting the Element Level Data into 4D.

It is of the utmost importance that Element Level Inspection Data mirrors the NBI condition ratings for each inspection report submission. The Element Level evaluation is to be reviewed by the DBIE and the ABIE with as much scrutiny that the NBI inspection report receives to assure consistency in the reporting.

The information contained in the Element Level Data is utilized by MassDOT in assessing the placement of structures on the Bridge Prioritization Model.

4.5 FIELD INSPECTIONS

All inspections performed shall be by Teams lead by Team Leaders, where at least two inspectors are on the site at all times, for safety reasons. It is understood that at times additional data or clarification may be required after the bulk of an inspection has been completed, and a team leader may visit the site for clarification as long it is safe do so. The Team Leader (TL) is the principle person in charge of the inspections. Work assigned by the TL during the inspection to the team members is ultimately the responsibility of the Team Leader.

4.5.1 Field Inspection for Initial Inspections

Initial Inspections are to be performed on the following: completed structures after they have undergone rehabilitation; newly constructed structures; or structures being added to the inventory for the first time.

It is understood, that during an Initial Inspection of a structure, the inspection team shall thoroughly examine all elements and state any irregularities observed in the Initial Inspection report. The secondary purpose of this inspection is to document the “as built” condition. Inspectors should also document any details in the main carrying members that differ from the construction drawings.

At a minimum the following shall be evaluated: beams should be evaluated for vertical alignment (plumb) and the presence of camber both positive and negative; if bearings exist they should be evaluated based on the type of bearing system present; guardrail and bridge railing alignment should be checked for both vertical and horizontal alignment; curb reveal measurements and locations where measurements were taken shall be obtained; substructure elements should be checked for vertical alignment. Photos of the elements above shall be stored as part of the history file for reference in the future to evaluate changed conditions when encountered.

For non-dive bridges it will be necessary to take stream bed profiles at both the upstream and downstream fascia to obtain an as built profile. This could be used in the future to determine if a scour is occurring and re-evaluation of Item 113 is required. Above water inspectors are to take the measurements. In some cases the measurements can be taken with drop lines from the bridge deck. If stream flow is too swift for drop lines other methods may be required. The data can be presented in chart form or in graph form or both. Points of measurement and elevation references must be clearly stated. Whatever method is chosen for use, it is important that it be repeatable from cycle to cycle. The value of the information is in the comparison from inspection to inspection to recognize major bed changes.

4.5.2 Field Inspection for Special Member Inspections

Team Leaders shall give Special Member Inspections their highest priority in their monthly scheduling. As such, every attempt shall be undertaken to perform Special Member inspections at the beginning of every month. If a Special Member Inspection is to be done in conjunction with a Routine Inspection, then both the Routine and Special Member Inspections shall be attempted to be completed at the beginning of the month.

The documentation of repairs performed on a structure shall be reported in the Special Member Inspection Report. As previously mentioned, Section 4.4, the ELBID shall also be updated and included in the submission of the inspection report.

Team Leaders shall be cognizant to inspect all structural components of a Special Member Element. For example, if the Special Member on a structure is for Item 59.4; Girders or Beams, and the inspection is to inspect the girder ends of 2 particular girders, then it shall be expected that the Team Leader will not only inspect the 2 particular girder ends, but shall inspect and document the deficiencies on all girders and beams for that particular detail and surrounding environment.

4.5.3 Field Inspection for Damage Inspections

Upon notification of an Incident, the DBIE shall dispatch an Inspection Team to the structure. The DBIE shall then concurrently notify the District Bridge Engineer and the Area Bridge Inspection Engineer. The Area Bridge Inspection Engineer will then notify the Bridge Inspection Engineer, who in turn will notify the State Bridge Engineer. The District Bridge Engineer, DBIE and inspection staff should be aware that a request for incident response may occur at any time of day or night.

Damage Inspection for verification of reported damage does not require extensive in-depth inspection of all members of the structure, but a cursory investigation to observe if the reported damage has affected other components or if damage is hiding or causing other damage or overstress. In addition, inspection should cover areas other than the immediate area of damage impact. This means Inspectors must assess the interconnectivity of the bridge elements to determine the paths that the initial impact force could have taken to inflict damage to other elements. Inspectors shall inspect and identify members or areas where items are disconnected or loose and could vibrate free, and are removed or directed to be removed by appropriate forces.

For example, diaphragms can transmit the initial impact force to other interior beams, causing localized damage around the diaphragm connections. Also, when reporting the information from a damage inspection, the inspector must obtain measurements to a known referenced fixed point on the structure.

When damage is verified and deemed to be a danger to pedestrians and/or vehicles, the site shall not be left unattended until the custodial owners have arrived and are preparing to respond with the necessary safety precautions. The Inspection Team shall document the safety precautions implemented in the Damage Inspection Report.

In situations where a repair cannot be performed immediately, after the appropriate maintenance forces have installed the hazard prevention devices, the District Bridge Inspection Engineer, with the concurrence of the District Bridge Engineer, shall establish a schedule for inspection to monitor and verify that the barricades and hazard prevention devices have not moved and are still effective until the danger has been resolved.

When a damage incident is reported by the District, and the Inspection Team has responded, inspected and written the Damage Inspection Report, the time associated with those activities shall be charged to the Reimbursable Cost Code generated by the District for that particular incident, if one has been generated.

4.5.4 Field Inspection for Scour Critical Structures

For bridges that have been determined to be Scour Critical it will be necessary to take stream bed profiles at both the upstream and downstream fascia to comply with the FHWA mandated Scour Plan of Action (POA). Scour Critical bridges have a numerical coding for Item 113 of 3 or less. For bridges that have underwater inspections, the stream bed profiles will be obtained by the Underwater Inspection Unit as part of their inspection. For non-dive bridges, the above water inspectors are to take the measurements. In some cases the measurements can be taken with drop lines from the bridge deck. If stream flow is too swift for drop lines other methods may be required. The data can be presented in chart form or in graph form or both. Points of measurement and elevation references must be clearly stated. Whatever method is chosen for use, it is important that it be repeatable from cycle to cycle. The value of the information is in the comparison from inspection to inspection to recognize major bed changes.

4.5.5 Plan of Inspection

In order to make the inspection as orderly and systematic as possible, the inspector should plan the inspection in advance. The plan shall include the review of previous inspections; load rating report; fracture critical procedures (if applicable); and SI&A. In addition, a plan includes determining the appropriate inspection sequence, establishing a time schedule, preparing for special inspection requirements (e.g. non-destructive testing and underwater inspection), organizing the field notes, anticipating the effects of traffic control procedures, and facilitating a thorough and complete inspection.

Prior to the actual inspection of a structure, the inspection team leader shall coordinate any and all parties (i.e.; RR flaggers, Police details, traffic set up, etc.) that may be required to accomplish the inspection. It is advisable that the team leader scope the bridge prior to the inspection to evaluate entry points, means of inspection, and any other aspects that may be required to inspect the structure.

The Team Leader shall be aware of the data needed for the particular inspection being performed. At times special requests are made and it is essential that all data is collected during the inspection. Once the Team Leader has reviewed the Load Rating Report, he/she may feel that a new rating may be warranted. In such cases the inspection will require in depth documentation and additional time to complete for the

preparation of a new load rating. Discussions with the District Bridge Inspection Engineer should occur so that other scheduled inspections get reassigned if needed.

4.5.6 Orientation

The orientation and numbering of bridge elements should be as shown on the plans whenever available. When plans are not available the rating report should be used. If no rating report exists, then the numbering of piers, beams, etc. shall be orientated from west to east, or from south to north.

It is important that the orientation of each element be clearly established. Orientation for rivers and streams is looking downstream. That is the left bank is on your left as you face downstream and the right bank is on your right as you face downstream. For tidal rivers, downstream is in the direction of the ebb (outgoing) tide.

Some examples:

- Identify substructure units (abutments) and sides of floorbeams, such as north/south or east/west designations; alternately, number the substructure units (piers) such Pier #3
- Sides of members can be identified by direction (e.g. "south side of floorbeam #2" or "north side of Pier #4")
- Span numbers and bay numbers should be used to identify general areas on the bridge, as shown on plans or as established otherwise
- Upstream or downstream designations can be assigned to structures over waterways (e.g., "upstream truss", "downstream girder", or "upstream arch")
- For truss elements, identify the member with joint designations

If the orientation used during the inspection differs in any way with that used in existing documents, these differences shall be clearly stated in the inspection report under the general remarks section of the inspection report.

4.5.7 Condition Information

To ensure a comprehensive condition inspection and as a part of the requirements of record keeping and documentation, an inspector shall record the type, size, quantity, severity and location of deterioration and deficiencies for each applicable element in a given component. The Bridge Inspectors Reference Manual (BIRM) and the Manual for Bridge Evaluation (MBE) are the inspectors' guide for identifying the members and the deficiencies on a variety of structure types.

The condition rating guidelines contained in the 1995 Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges (or most recent) are to be used in the evaluation of the deck, superstructure, and substructure. During the inspection, the inspector shall be aware of items in the SI&A that must be verified and updated, should it be required.

The outcome of the inspection shall always be to provide a clearly presented narrative description of the conditions. Inspectors shall note the following: all signs of distress, failure, or defects with sufficient accuracy so that another inspector at a future date can make a comparison of condition or rate of deterioration; load, speed, or traffic restrictions on the bridge; information about high water marks and unusual loadings, the presence of any negative camber on any elements, and section losses to beam ends.

All work or repairs to the bridge since the last inspection should be documented. If work is undertaken on a structure that improves the physical condition of a structure and results in the Team Leader increasing the numerical value of an element, the Team Leader must explain what work was undertaken to improve the condition. Verify or obtain new dimensions when maintenance or improvement work has altered the dimensions of the structure.

The end result of the inspection performed is to ensure the public that a safe structure is in place to carry traffic. The data collected on defects found helps with the determination of the safe load carrying capacity of the structure. The documentation will assist the custodian of the structure with important information for the proper maintenance and rehabilitation information. Consistency in coding, data collection and documentation is discussed in subsequent sections.

4.5.8 Critical Inspection Findings

Deficiencies are occasionally discovered during bridge inspections that require immediate action. They can be structural in nature such as a severely undermined girder bearing or they may present a hazardous situation to the travelling public. When such deficiencies are discovered a special procedure of notification is warranted as explained below.

4.5.8.1 Critical Structural (CS/I) Definition and Notification

If a deficiency is discovered that may affect the structural integrity of the bridge, it is considered a Critical Structural Deficiency. A Critical Structural Deficiency is defined as a deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge. Because of the critical nature of the deficiency the urgency code must be Immediate. To assure an immediate response the details of the deficiency must be transmitted quickly. During an inspection, if an inspector discovers a Critical Structural deficiency, the inspector shall immediately notify the DBIE, or in his absence, the DBE. For more information, refer to Section 4.7 of this Handbook regarding CS/I documentation.

4.5.8.2 Critical Hazard (CH/I) Definition and Notification

If a deficiency is discovered that poses an extreme hazard or unsafe condition to the public, it is considered a Critical Hazard. A Critical Hazard condition is defined as a deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Because of the critical nature of the deficiency the urgency code must be Immediate. To assure an immediate response the details of the deficiency must be transmitted quickly. During an inspection, if an inspector discovers a Critical Hazard deficiency, the inspector shall immediately notify the DBIE, or in his absence, the DBE. For more information, refer to Section 4.7 of this Handbook regarding CH/I documentation.

4.5.9 Request for Re-Evaluation of Item 113 - Scour Critical Bridges

The Team Leader must be aware, able to recognize and document changes that are occurring in the stream bed in the vicinity of the structures. These changes, documented by inspections, are to be used to assist the DBIE in determining if the request for a re-evaluation of Item 113 - Scour Critical Bridges is necessary. A re-evaluation does not just apply to structures with Item 113 less than or equal to a

numerical rating of 3. A re-evaluation may be necessary for structures with Item 113 greater than a 3. If a re-evaluation is required, then the Bridge Scour – Item 113 Re-evaluation Form will be filed out and submitted to the Area Bridge Inspection Engineer, see Attachment 4-2.

Some concerns the Team Leader shall be aware of and document are as follows:

- Channel changing course
- Evidence of erosion or scour around footings and embankments
- Large amounts of debris around the substructure
- Evidence of rip rap, bank protection removed or altered
- Stream work performed by others that might change the hydraulic characteristics at the bridge

All of the concerns mentioned above could result in a request for a re-evaluation.

In Summary, a request for an Item 113 re-evaluation shall be submitted for the following cases

- When a structure over water has been replaced
- Substructure scour repairs performed and/or streambed scour countermeasures have been installed on a structure that is scour critical
- Significant changes mentioned above have occurred that alter the stream bed or flow characteristics of the waterway

4.5.9.1 Structure over Water That Has Been Replaced

When a structure over water has been replaced, the DBIE will be required to forward the Initial Inspection to the ABIE who will then submit the report to the Bridge Engineer for an initial coding of Item 113.

4.5.9.2 Substructure Scour Repairs Performed and/or Stream Bed Scour Countermeasures Installed

When a structure is scour critical and has had scour repairs performed on the substructure and/or stream bed scour countermeasures have been installed, the DBIE will be required to forward the Inspection that documents the improvements to the ABIE, who will then submit the report to the Bridge Engineer for re-evaluation of Item 113 coding.

4.5.9.3 Stream Bed or Waterway Changes

The Team Leader shall compare the stream bed profiles being collected and waterway changes to what was documented in past inspections. The loss of the stream bed material, or change in flow characteristics may warrant the re-evaluation of the Item 113 to ensure proper coding and structural stability. The DBIE will submit these Inspection Reports with the documented findings on the streambed changes to the ABIE who will submit the report to the Bridge Engineer for re-evaluation of Item 113 coding.

4.5.10 Reporting of Structurally Deficient Bridges

When a Team Leader inspects a structure and observes a condition that warrants a lowering of the numerical condition coding of a structure to a 4, or from a 4 to a 3, for Item 58, Item 59, Item 60, or Item

62, they shall notify the District Bridge Inspection Engineer. Preferably, this notification shall be done while the Team Leader is still at the structure, so as to allow the DBIE the opportunity to come to the structure to observe and concur with the Team Leader's decision. The intent of notifying the DBIE would be to ensure Items 90 thru Item 92 are coded in a timely manner so that the next inspection is undertaken.

4.5.11 Other Information Gathered at Routine Inspections

4.5.11.1 Request for Rating or Re-rating

The Team Leader shall be responsible for recommending a rating request or a re-rating request for a structure. This recommendation shall be stated in the request for rating or re-rating block located on the 2nd page of the Routine Inspection Report or 1st page of a Special Member Inspection Report. The Team Leader shall evaluate the deficiencies observed on the structure and any alterations made to the structure, in relation to the previous rating report, which would warrant a recommendation to rate or re-rate a structure.

4.5.11.2 Curb Reveal Measurements

The average curb reveal measurement should be used in documenting the curb reveal on the inspection report. The curb reveal measurement is taken primarily to identify if additional pavement material has been added to the structure since the last inspection. The measurement should be made to the nearest 10 mm. If there is no curb, then a measurement should be taken from the parapet, either the top or lowest break line and the point of reference should be clearly defined so that future measurements can be repeated. The reference point shall be stated in the curb comments of the inspection report.

4.5.11.3 Vertical Clearance Measurements & Vertical Clearance Signage Verification

Inspection Teams are required to check the low point vertical height clearances under a bridge, or through a bridge in the case of thru truss bridges, or both. The low point clearance is taken within the traveled way. The travel way is defined as the roadway lane that is allowing travel on a regular basis. Team Leaders should use their judgment when accessing a roadway traveled way. For example, if a roadway has a breakdown lane that travel is permitted on a regular basis, then the clearance will need to be verified at the outer limits of the breakdown lane. Team leaders should not adjust clearance measurements because the travel way is being altered for the convenience of a construction project.

Vertical clearances shall be taken during every routine or damage inspection performed. However, it is understood that it should not be different unless a change condition has occurred to the wearing surface below the structure or on the structure as in the case of a thru truss bridge. This verification frequency will ensure accuracy of the data being recorded at the time of the inspection. The location of the low point(s) should be clearly identified on a framing plan incorporated into the inspection report, see Attachment 4-3. Team Leaders shall place a note in the general remarks when they do not verify the vertical clearance and the reason why.

When the inspection team field verifies the vertical clearance height is less than 14'-6", then the team shall verify the placement of any clearance posting signs in the field during the inspection. Note if any of the "advanced" clearance posting signs or "at bridge" clearance posting signs are missing, then the Team Leader shall notify the DBIE of the missing signs and the location of the missing signs.

In relation to the discussion in this article, it is appropriate to define the "At Bridge" and "Advanced" clearance posting sign terms:

At Bridge Clearance Posting Signs: Signs erected immediately in advance of, or on the bridge being posted.

Advance Clearance Posting Signs: Signs placed at approach road intersections or other points where a vehicle which exceeds the posted limits must detour or turn around.

There are no Massachusetts General Law requirements for installing clearance posting signs, however in order for a bridge to be considered properly clearance posted, an At Bridge Sign must be either within visible distance of the structure or attached to the structure and be erected facing each direction of traffic. If there is an intersecting street between the sign and the bridge, an additional sign must be erected immediately adjacent to the bridge. These additional signs must be in place in order for the bridge to be considered properly posted.

When the inspection team field verifies that the vertical clearance is equal to or exceeds 14'-6", then the team leader shall record the measurement and check off the "not applicable" box in the area of the report dedicated for "Clearance Posting" on the inspection report. Further discussion of clearance posting sign procedure is contained in Section 4.8 of this Handbook.

4.5.11.4 Weight Posting Verification & Weight Posting Signage Verification

The Team Leader shall review the latest rating report of the structure to be inspected, if one exists, so as to obtain any recommended posting for the structure. The Team Leader shall verify the actual weight posting for the structure in the field and compare it to the recommended weight posting contained in the rating report. The actual and recommended weight posting values shall be stated in the "weight posting" area of the inspection report. If a discrepancy exists between the actual and recommended weight posting recommendation, then the Team Leader shall notify the DBIE of his findings.

The Team Leader shall verify the "at bridge" and "advanced" weight posting signs are in place and are accurate for all structure that require posting.

Further discussion of the actions to be taken by the DBIE when discrepancies are encountered shall be contained in Section 6.11 of this Handbook.

4.5.11.5 Average Daily Traffic

At every Routine Inspection the inspector shall refer to the MassDOT website location to obtain traffic data counts for the structure being inspected. The website is at the MassDOT TransNet site. Click on Highway, then Quick Links, then Departments, under Design and Engineering, click Traffic Data Collection. In the first paragraph there is a link to the interactive map. Zoom in to your area of interest. The map shows where the latest traffic counts have been taken and the year.

If there are no traffic counts available on the website, then a manual vehicular and truck traffic count on the structure shall be undertaken. The counts shall be performed and the SI&A shall be marked with the time the counts where taken and number of vehicles observed. The counts can then be calculated using

the formulas and example attached in Attachment 4-4. Other instructions on what will be recorded in Items 29, 30 and 109 of the SI&A are in subsequent sections.

The Team Leader should use his/her judgment as to whether or not the traffic counts at the MassDOT website are still relevant. This could depend on how old the count is, whether traffic patterns have changed for the area, etc. If the TL suspects that the counts may not represent current traffic conditions then the team should obtain a manual count as described above.

4.5.11.6 Inventory Photos

During the Initial Inventory Inspection, a series of photographs shall be taken to document the structure for inventory purposes. At a minimum, the following views shall be taken:

- Two photographs of the roadway on the bridge, one from the approach roadway at each end of the bridge, taken such that the near guardrail-bridge rail transition is clearly visible
- Two elevation photographs, one of each elevation of the bridge
- One photograph of the general underside of the bridge
- If the bridge is over water, two photographs, one looking upstream and the other downstream from the bridge

If the bridge has any unusual features or characteristics, a photograph should be taken of them for inventory purposes as well. If the bridge has a commemorative plaque, or multiple commemorative plaques attached to the structure, a photograph of each plaque shall be taken and included in the inventory photos. The photo shall be taken directly perpendicular to the plaque with a measured scale, such as a tape measure or folding ruler, placed adjacent to the plaque within the photograph so that its true size can be obtained in case it needs to be duplicated in the future.

During the life of the bridge, this series of inventory photographs shall be repeated every ten years unless conditions at the bridge have changed dramatically before the ten year time period is out, rendering the previous set obsolete. These photos shall be saved in the 4D database.

4.5.11.7 Stream Bed Profiles

For all bridges over water that are non-dive bridges, the Team Leader will take stream bed profiles measurements at both the upstream and downstream fascia and record this in the inspection reports. In some cases, the measurements can be taken with drop lines from the bridge deck. If stream flow is too swift for drop lines other methods may be required. The data can be presented in a chart form or in graph form, or both. Points of measurement and elevation references must be clearly stated. Whatever method is chosen for use, it is important that it be repeatable from cycle to cycle. The value of the information is in the comparison from inspection to inspection to recognize major bed changes.

For bridges that have underwater inspections, the stream bed profiles will be obtained by the Underwater Inspection Unit as part of their inspection.

4.6 INSPECTION DOCUMENTATION and REPORT WRITING

4.6.1 Creation of Inspection Report

Team Leaders are responsible for the creation of the inspection report record in the Bridge Inspection Management System (4D). The report record shall be created in the system while the field inspection is occurring. If it is not created while inspection is ongoing it shall be in the system no later than 3 days after the inspection has been completed. It is understood that the creation of this record as a duplicate of the previous inspection is acceptable. In no way will this inspection report be construed as the actual inspection report until the Team Leader has committed the report for review.

4.6.2 Date of Inspection

When inspections are performed over multiple days, the start date of the inspection should always be used for the report and SI&A coding. The start date is the date that elements are actually inspected (a recon of a structure shall not be considered as a start date). This is especially important when inspections are started in one month but completed in the next month.

When inspections are delayed for access issues such as construction operations or right-of-entry permit acquisition, the inspection team should complete as much of the inspection that is physically possible and complete an inspection report depicting the areas and elements inspected. The report should clearly state the limits of the inspection and explain which areas were not inspected and why. When access for the other areas is granted and/or possible, the TL should then return to the bridge to complete an "Other" inspection with its own date of inspection.

4.6.3 Inspection Defects

In the inspection of a structure, a Team Leader may discover faults, flaws and imperfections to the structural elements. These defects should be identified and described by their type, size and location. The Team Leader shall document the defect and describe the seriousness of the defect in the body of the inspection report. If, in the opinion of the Team Leader, an observed defect could receive CORRECTIVE ACTION, then it is to be considered a DEFICIENCY.

4.6.4 Inspection Deficiencies

The Team Leader shall assign a deficiency code to any observed defects that require corrective action. A deficiency code consists of a Deficiency Category and an Urgency Code. The complete Deficiency Code is entered in the column adjacent to the sub-elements condition rating on the Routine Inspection Report. The code is similarly entered on Special Member and Fracture Critical Inspection Reports as needed.

Deficiencies are classified into four categories. The categories are as follows:

M = Minor Deficiency: Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples may include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion to steel, Minor scouring, Clogged drainage, Minor damage to guard rail, etc.

S = Severe/Major Deficiency: Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples may include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroding rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S = Critical-Structural Deficiency: A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge. All Critical-Structural Deficiencies need Immediate corrective action.

C-H = Critical-Hazard Deficiency: A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples may include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc. All Critical-Hazard Deficiencies need immediate corrective action.

Urgency codes are classified into three categories. The categories are as follows:

P= Prioritize: Shall be prioritized by District Bridge Engineer or the Responsible Party (if not a State bridge) and repairs should be made when funds and/or manpower available.

A= As soon as possible: Action/Repair should be initiated by District Bridge Engineer or the Responsible Party (if not a State bridge) upon receipt of the Inspection Report.

I= Immediate Corrective Action: Immediate means that Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and receive further instruction from him/her. This level of urgency shall only apply to C-S and C-H deficiencies.

4.6.5 Inspection Dimensioning

Sufficient dimensions shall be provided of any deficiencies observed. The dimensioning shall provide actual size measurements and depth measurements to capture the scale of the defect. These measurements shall then be referenced to a fixed and definable reference point on the structure. It is desirable that all reference points refer from the centerline of bearings for the structure. All units of measurement shall be stated in English Units.

Inspectors shall measure and record crack sizes found during inspections. They shall record the lengths and widths and depths were possible and reference to the locations of the cracks to a fixed point on the structure.

When inspectors discover section loss on structural steel elements (i.e.; girders, stringers, truss elements, or reinforcing bars) they shall measure and state the **remaining** structural steel available. The inspector shall **not** assume a section loss percentage, but shall provide measurements of remaining thickness.

4.6.6 Inspection Sketches

When inspecting bridges, it may be necessary to use sketches to clarify locations and/or details of defects. When the sketch format is selected for recording bridge inspection results, the information should be recorded systematically.

In most cases it will be possible to use reproductions of portions of the plans for the sketches. However, in some instances, such as when the "as built" detail is different from what is shown on the construction drawings, an accurate sketch showing the existing detail will have to be drawn.

For examples of typical sketches, see Attachment 4-5: Typical Underside of Deck Condition Sketch, Attachment 4-6: Typical Beam End Elevation Sketch, Attachment 4-7: Typical Beam Elevation Sketch, and Attachment 4-8: Typical Cross Section View of Deteriorated Prestressed Concrete Beam.

4.6.7 Inspection Photos

All photographs shall be taken in color with a digital camera. The camera used shall be capable of taking all required photographs in proper focus and sufficient level of detail, whether overall inventory photographs or close-up detail photographs of deficiencies. The camera must also be capable of operating with an adjustable flash unit in order to properly light up dark areas and fine details. It is preferable that the camera will record a date stamp on every image.

A photograph should be taken to assist either the written description or sketch of a deficiency. If there are several deficiencies of the same type, a photograph would be taken to show a typical deficiency while sketches would be used to show and dimension each deficiency at each location.

When photographing a deficiency, it is usually best to take two photographs, one being a general view of the deficiency which should locate it in relation to the rest of the bridge structure, while a second should be a close up of the deficiency itself, showing its extent and any distinguishing features. This close up view must be in focus, properly lit and should include a ruler to help establish the scale of the deficiency. A pencil, pick or screw driver tip may be used to point to important details that might otherwise be overlooked in the photograph.

If a deficiency is being monitored as part of Special Member Inspection, in lieu of repair, every effort should be made to take a new detail photographs from the same location and at approximately same scale as the ones before so that the progress of the deficiency can be readily established.

4.6.8 Videos of Deficiencies

In some cases, a deficiency is only apparent when under traffic. For example, the longitudinal joint between butted precast beams may have failed so that the beams are deflecting independently of each other. This situation could only be documented during a live action video of a vehicle going over the bridge. In such cases, the video segment should be shot showing the deficiency in action. The video

should be properly focused, well lit and the view should be framed such that the entire action is kept within the view of the camera without having to move the camera to follow the action. If at all possible, a ruler should be used to establish the scale of the view and deficiency. The video will then be forwarded, via email, to the District Bridge Inspection Engineer, District Bridge Engineer, Bridge Inspection Engineer and the Area Bridge Inspection Engineer.

4.6.9 Condition Coding

The numerical condition ratings should characterize the general condition of the entire component being rated. They should not attempt to describe localized or nominally occurring instances of deterioration or disrepair. Correct assignment of a condition rating must, therefore, consider both the severity of the deterioration or disrepair and the extent to which it is widespread throughout the component being rated.

It shall be noted that a bridge's load-carrying capacity is **not** to be used in the condition coding process. The fact that a bridge was designed for less than current legal loads, and may even be posted, should have no influence upon the condition rating.

Narrative descriptions of the conditions should be clearly presented. Note all signs of distress, failure, or defects with sufficient accuracy so that another inspector at a future date can make a comparison of condition or rate of deterioration. When a sub-item is assigned a numerical condition of 6 or less, the inspector will be required to write a narrative description of the defect. Also, if any sub-element is assigned a deficiency coding of S-A, then it will be required that a photo of the sub-element be contained in the inspection report.

In relation to Item 60, 61 and 62, the inspection report will have two columns (Dive & Cur) for each sub-element. If a bridge is a Dive (Underwater Inspection) bridge then the inspectors shall import the condition rating of each sub-element from the latest Underwater Inspection Report and place them in the "Dive" column. The Inspector's own evaluations of these sub-elements are coded in the "Cur" column. Generally, the overall condition of each of the above items is the lower number between Underwater Inspection Report and the Inspector's Report and that would be the number which is entered in the SI&A. The above water inspector needs to review what is contained in the Underwater Inspection Report and make the determination if the item controlling the Underwater Inspection is valid for controlling the overall condition. Two examples and attachments are provided for clarification as follows:

Example #1: The "Abutment" from an Underwater Inspection Report is an "N" and from a Routine Inspection is a "6". The "Pier or Bents" from an Underwater Inspection Report is a "7" and from a Routine Inspection is a "5". The "Pile Bents" from both reports is an "N", then the overall "Abutment" rating is a "6", "Pier or Bents" is a "5" and "Pile Bents" is "N". Overall condition rating of the Item 60 (Superstructure) would be a "5" and this is the number which will be coded in the SI&A. The Routine Inspection condition rating is less than the Underwater Inspection Condition Rating. Refer to Attachment 4-9, Example 1: Condition Coding of Item 60.

Example #2: The "Abutment" from an Underwater Inspection Report is a "6" and from a Routine Inspection is a "7". The "Pier or Bents" from an Underwater Inspection Report is a "5" and from a Routine Inspection is a "7". The "Pile Bents" from both reports is an "N", then the overall "Abutment" rating is a "7", "Pier or Bents" is a "7" and "Pile Bents" is

"N". Overall condition rating of the Item 60 (Superstructure) would be a "7" and this is the number which will be coded in the SI&A. Although, in this example the Underwater Inspection overall condition rating is a "5" the scour that has occurred does not impact the main load carrying member of this rehabilitated structure. The existing arch structure is remaining but the new structure above the arch is supported on piles. Loads are not being transferred to the arch. Refer to Attachment 4-10, Example 2: Condition Coding of Item 60.

4.6.10 Narrative Presentation

The narrative presentation shall be the writing remarks segment of the inspection report summarizing the field inspection findings of the inspection team.

The narrative shall begin with the inspector describing the method of orientation selected to orient the reader. The inspector will then write in the "General Remarks" section any load, speed, or traffic restrictions on the bridge, as well as any special means of access utilized to inspect the structure. Include information about high water marks and unusual loadings. Also, all work or repairs to the bridge since the last inspection should be listed. If work is undertaken on a structure that improves the physical condition of a structure, the Team Leader must explain what work was undertaken to improve the condition. Verify or obtain new dimensions when some maintenance or improvement work has altered the dimensions of the structure.

When numerous defects are to be documented under a sub-element it is encouraged to do so in "bullet" form. The condition narrative should begin with a summary statement which identifies the general condition and/or highlights the controlling deficiencies that are presented in the bullets which are listed below. Refer to Attachment 4-11 for an example of presenting information in an inspection report. The application of this method of presentation will allow the ease of comparison between successive inspection cycles and allow for the visual progression of the deterioration of the sub element.

4.6.11 SI&A Edits

During every inspection cycle, the inspector shall submit a marked up SI&A sheet with every inspection report submission. Team Leaders shall submit a copy of the SI&A sheet with all suggested revisions for the latest inspection marked up in red. At a minimum the latest inspection date should be revised. Other common revisions may include condition ratings for Items 58, 59 and/or 60 as well as ADT dates and values. After the corrections are made to the SI&A sheet electronically (within 4D) by the District Bridge Inspection Engineer or his/her designee a copy of the revised sheet should be printed out and attached to the inspection report. Refer to Attachment 4-12 for an example of a marked up SI&A sheet. It shall be noted on the marked up copy of the SI&A sheet that the ADT was calculated and shown, the changes that were recommended for Item 58, 59, and 60 are shown and any changes recommended on the appraisal section are shown.

4.6.12 Element Level Inspection Report

The Element Level inspection report is produced within the bridge inspection module of 4D under the "Pontis" tab. A separate report is produced and is printed out as an attachment to the inspection report. As mentioned previously, the Element Level report is required with each Routine Inspection and when inspections are performed to document improvements from rehabilitation efforts.

When completing an Element Level inspection report on a bridge that is a dive bridge, the Team Leader must ensure that the Underwater (U/W) Element Level inspection information is incorporated into the above water Element Level report. The U/W Element Level inspection data is a paper report only. The above water Element Level report is where the information is entered into the 4D database. The Team leader should obtain a copy of the latest U/W inspection report and Element Level inspection report prior to the above water inspection and incorporate the U/W information on his/her Element Level inspection report.

4.7 CS/I & CH/I PROCEDURE AND DOCUMENTATION

In the case of Critical-Structural and Critical-Hazard Deficiencies which require **Immediate** corrective action, the Inspection Team Leader (TL) shall immediately verbally notify the District Bridge Inspection Engineer (DBIE), who after verification shall immediately verbally notify the District Bridge Engineer and the Area Engineer (who in return will immediately notify the Bridge Inspection Engineer, who in return will notify the State Bridge Engineer and FHWA officials).

Upon observation of a deficiency, the Inspection Team Leader (TL) shall code all the deficiencies and complete the inspection report and include all sketches and photographs necessary to clearly identify the deficiencies. All reports shall then be given to the DBIE who after review of the report shall forward it to the District Bridge Engineer (DBE) for corrective action. The Team Leader shall indicate in the inspection report the notification of the DBIE.

When the deficiency is verified and deemed to be a danger to pedestrians and/or vehicles, the site shall not be left unattended until the custodial owners have arrived and are preparing to respond with the necessary safety precautions. The Inspection Team shall document the safety precautions implemented in the Inspection Report.

4.7.1 CS/I & CH/I Field Observations at MassDOT Owned Bridges

In the case of a Critical Deficiency, in addition to the prior paragraphs requirement, the DBIE shall prepare a Critical Deficiency Activity Log/Critical Deficiency Verification Form (See Attachment 4-13: Critical Deficiency Activity Log/Critical Deficiency Verification Form) and forward a scanned copy via email to the District Bridge Engineer. The log documents the reporting of the Critical Deficiency and requests that it be returned with documentation of the action taken. Copies shall be forwarded to the Bridge Inspection Engineer who in turn will forward a copy to the FHWA and shall catalog the CS Deficiency in a database.

4.7.2 CS/I & CH/I Field Observations at Municipally Owned Bridges

In the case of Critical-Structural and Critical-Hazard Deficiencies which require Immediate corrective action, the District Bridge Inspection Engineer shall immediately notify the Municipal Officials in Charge.

The DBIE shall prepare the Critical Deficiency Activity Log/Critical Deficiency Verification Form (see Attachment 4-13) with supporting documentation and send a copy to the Municipality with a cover letter signed by the District Highway Director (see Attachment 4-14). Copies shall be forwarded to the District

Bridge Engineer and Bridge Inspection Engineer who in turn will forward a copy to the FHWA and shall log the CS Deficiency in a log book.

4.7.3 Follow-Up Procedures on Critical Deficiency Findings

The Follow-Up Critical Deficiency Inspection process is intended to meet the NBIS requirements for recording the corrective action taken by the Department or Municipality as a result of the Bridge Inspection Unit filing a Critical Deficiency in the Inspection Report found during an inspection. This procedure shall be used for all MassDOT and Municipally-owned bridges as follows. The process should be completed as soon as possible after repair, but no later than one month after the report of Critical Deficiency.

4.7.3.1 Procedures – Follow-Up Procedures for MassDOT Bridges

The District Bridge Inspection Engineer shall verify and document the status of the Critical Deficiency. If the deficiency has been addressed then the DBIE shall ensure that the Verification Form has been signed and forwarded to the appropriate parties. Copies shall be forwarded to the Bridge Inspection Engineer who in turn will forward a copy to the FHWA and shall log the CS Deficiency in a log book.

If the deficiency has not yet been addressed, the DBIE shall notify the ABIE that the status of the CS/I has not changed. The ABIE shall then forward the notification of the un-changed CS/I to the BIE who shall initiate a conversation with the District Bridge Engineer regarding the schedule for such repair. A hard copy of the email string should be retained as documentation of the situation. If the schedule for repairs has not been determined, then a follow up Critical Deficiency memo (Attachments 4-15 or 4-16) shall be sent.

The completed Follow-Up Critical Deficiency Notification Form (See Attachment 4-15 and 4-16) and re-inspection report shall be filed in a separate file in both the District Bridge Inspection Engineer's Office and the Boston Bridge Inspection Engineer's Office. A copy of all correspondence will also be kept in both the District's and Boston's Bridge History File.

4.7.3.2 Procedures – Follow-Up Procedures for Municipally Owned Bridges

The District Bridge Inspection Engineer shall verify and document the status of the Critical Deficiency. The DBIE shall then prepare the Follow-Up Critical Deficiency Notification Form (see Attachment 4-17 and 4-18) and send a copy to the Municipality with supporting documentation with cover letter signed by District Highway Director. Copies shall be forwarded to the Bridge Inspection Engineer who in turn will forward a copy to the FHWA and shall log the CS Deficiency in a log book.

The completed Follow-Up Critical Deficiency Notification Form and re-inspection report shall be filed in a separate file in both the District Bridge Inspection Engineer's Office and the Boston Bridge Inspection Engineer's Office. A copy of all correspondence will also be kept in both the District's and Boston's Bridge History File.

4.7.3.3 Repeat Procedures – Follow-Up Procedures for MassDOT & Municipally Owned Bridges

The procedures outlined in Section 4.7.3.1 and 4.7.3.2 shall be repeated when re-inspection verifies that the Critical Deficiency has not been corrected.

4.8 VERTICAL CLEARANCE SIGNAGE PROCEDURE

MassDOT clearance sign procedure is derived from the latest FHWA Manual for Uniform Traffic Control Devices (MUTCD), in which it states that Low Clearance signage shall be used to warn road users of clearances less than 12 inches above statutory maximum vehicle height. Massachusetts General Laws (M.G.L.) Chapter 90 Section 19 states no vehicle shall exceed a height of 13'-6". Clearance posting of the roadway is the responsibility of the roadway owner, not the owner of the obstruction (bridge, railroad structure, pedestrian structure).

When vertical measurements taken in the travel way are less than 14'-6", then vertical clearance signs will be required. MassDOT's recommended posting values as they relate to the measured field clearance are shown in Chart 4.8-1 below. These recommended posting values are to be used to provide consistency throughout the Commonwealth. Recommended posted clearance values have been derived to be within what is allowable as mentioned in the MUTCD. MUTCD states a reduction not to exceed 3 inches should be used. The reduction reflected in the chart is established to account for the dynamic envelope of the vehicle.

Field Measured Clearance	Recommended Posted Clearance
≥ 14' - 6"	NO POSTING REQUIRED
< 14' - 6" but ≥ 14' - 5"	14' - 3"
< 14' - 5" but ≥ 14' - 4"	14' - 2"
< 14' - 4" but ≥ 14' - 3"	14' - 1"
< 14' - 3" but ≥ 14' - 2"	14' - 0"
< 14' - 2" but ≥ 14' - 1"	13' - 11"
< 14' - 1" but ≥ 14' - 0"	13' - 10"
< 14' - 0" but ≥ 13' - 11"	13' – 9"
< 13' - 11" but ≥ 13' - 10"	13' - 8"
< 13' - 10" but ≥ 13' - 9"	13' – 7"
< 13' - 9" but ≥ 13' - 8"	13' – 6"

Chart 4.8-1

Special consideration shall be given for signing in situations when the clearance varies along the travel way. This situation occurs at times with Arch structures. Attachment 4-19 is an example showing how to post for an arch structure. Truss portals are another situation that may require clarification by signing the low point location to alert the driver of where the clearance is the lowest along the roadway. Attachment 4-20 is an example showing how to post for the low point along the truss portal.

4.8.1 Notification to Post under Clearance - State Owned Roadway

For roadways under the jurisdiction of MassDOT, the DBIE will be responsible for sending out the notification to the responsible party in the District office that will erect the requested clearance posting signs. Attachment 4-21 is an example of what is sent to the District representative that is responsible for the placement of the signs. Exhibits should be attached to the requests for clarification with regards to where the signs are to be located.

4.8.2 Notification to Post under Clearance – Municipally Owned Roadway

For roadways under the jurisdiction of a Municipality, the DBIE will be responsible for sending out the notification to the Municipality requesting that posted clearance signs are required. Attachment 4-22 is an example of what is to be sent to the Municipality. Exhibits should be attached to the requests for clarification with regards to where the signs are to be located.

4.9 COMPLETION and SUBMISSION of INSPECTION REPORTS by TEAM LEADERS

All MassDOT Inspectors and Consultant Inspectors shall follow the procedures established for completing and submitting inspection reports as outlined in Sections 4.9.1 and 4.9.2, respectively. This procedure shall be used for all MassDOT and Municipally-owned bridges under the NBIS program.

A complete inspection report includes a hard copy of the inspection report, Element Level inspection, and a marked up SI&A. Dive reports are not required to be submitted with the inspection report. They are sent to the bridge owner by the Underwater Operations Unit.

4.9.1 MassDOT Inspections

Inspection reports completed by MassDOT teams shall be completed within the MassDOT Bridge Inspection Management System (4D) no later than the 15th day of the month following the inspection.

4.9.2 Consultant Inspections

Inspection reports completed by Consultant teams shall be completed within 4D no later than 21 days following completion of the inspection, or in accordance with specific deadlines contained in their inspection contract.

Upon initial completion of the inspection report and a QC/QA review by the Consultants PM, the Consultant TL should indicate within 4D that the report is ready for review. The Consultant TL should then send an email to the DBIE alerting him/her that the inspection report is ready for review.

4.10 DBIE INSPECTION REPORT REVIEW

The DBIE and the ADBIE shall collectively review 100% of all inspection reports. The DBIE or ADBIE will sign all inspection reports reviewed by him/her. If the ADBIE signs the inspection report that they have reviewed, the ADBIE shall sign his/her name and place the word “for” after their name.

The DBIE will be personally responsible for the review of all inspection reports that have an assigned numerical ratings of 5 or below for Item 58, Item 59, Item 60, or Item 62. The Assistant District Bridge Inspection Engineer may be responsible for the review of all inspection reports that have assigned numerical ratings of 6 or greater for Item 58, Item 59, Item 60, or Item 62 if the DBIE chooses to delegate that task to the ADBIE.

When required based on operational needs, the DBIE may perform an inspection as the Team Leader. In such cases, the DBIE should sign the inspection report as the team leader. The ABIE will then perform the function of the DBIE and shall review and sign the inspection report. This occurrence shall only be done on an intermittent basis when extenuating circumstances arise.

Note: The signatory's signature on the inspection report only signifies that the signatory has reviewed the inspection report in accordance with FHWA and MassDOT standards. The signature does not under any circumstances signify, nor has it ever signified even prior to the formal issuance of this Handbook, the corroboration of the accuracy and thoroughness of either the field inspection itself, the assessment of the structure's condition by the Team Leader, or the description of the structure's condition by the Team Leader on the inspection report.

4.10.1 DBIE Review of MassDOT Inspections

The DBIE shall complete a review of all internally completed inspection reports in a timely manner and in conformance with metrics determined by the District. Approved reports shall be signed and one copy shall be submitted to the Bridge Inspection Engineer.

4.10.2 DBIE Review of Consultant Inspections

The DBIE will complete an expeditious review of the inspection report within 4D in a timely manner and in conformance with metrics determined by the District.

If revisions are requested, the DBIE should either email the Consultant's PM and TL with the requested changes, or indicate within 4D the requested changes. When changes are made, the Consultant PM and TL should again inform the DBIE. When the report is deemed acceptable the DBIE shall check the report approved within 4D.

The consultant shall print out a hard copy, sign the original and submit it with two copies to the Bridge Inspection Engineer. The BIE will then update 4D with the report submission information.

The report will be forwarded to the DBIE through the ABIE with a Bridge Inspection Consultant Performance Evaluation Report form, see Attachment 4-23. The DBIE is to provide an evaluation score, sign the inspection report and copies and return one report to the ABIE along with the evaluation form.

4.10.3 DBIE Review of Inspection Report Content

A review by the DBIE will include the review of all inspection reports for bridges in their district prepared by MassDOT staff and/or Consultants for compliance with FHWA, NBIS and MassDOT requirements before the data is entered in the bridge inventory files.

The DBIE is not responsible for reviewing inspection reports for bridges of other state agencies.

The DBIE's review will consist of the following:

1. Overall review of the Inspection Report to ensure that the correct form has been used, that the correct bridge is identified and that all required information has been entered.

2. Review that all information has been correctly entered in accordance with the FHWA Coding Guide and the MassDOT Bridge Inspection Handbook criteria. This review will include but not be limited to a check that proper coding conventions, format, significant digits and correct units have been used.

3. Check that the Condition Ratings for Items 58 through 62 are consistent with the condition ratings of the individual sub-items.

4. Check that there is adequate documentation for inspection sub-items with condition ratings of 6 or lower.

5. Check that all Photographs and/or Sketches have been properly cross referenced to the Inspection Report.

6. Check that there is consistency of information between the current Inspection Report and previous Inspection Reports, as well as the Dive Report and/or Rating Report, if applicable.

7. Check that proper documentation was incorporated into the inspection report for any changes that may have occurred from the previous SI&A and previous Inspection Report.

8. Review of all Items in the SI&A after data entry to check that they have been properly and correctly entered.

9. For Initial Inventory Inspections, a check of the inventory data on the SI&A against the construction plans to ensure that the data is consistent.

10. For every initial inspection, a set of Inventory Photos has been taken and included in the report.

11. For every routine inspection, an Element Level inspection created with the routine inspection shall be reviewed for accuracy, including elements, quantities and condition states.

4.11 DISTRIBUTION OF COMPLETED INSPECTION REPORTS

Upon approval of the inspection report, the DBIE shall review the marked up SI&A and ensure all changes are made. The DBIE shall print out a new SI&A and attach it to the inspection report.

Completed Inspection reports shall be distributed by the DBIE to the bridge owners as follows:

Boston HQ copy:	Report; SIA; Marked-up SIA; Element Level Inspection Report
District copy:	Report, Element Level Inspection Report
Municipal copy:	Report only. The cover letter* is from the district with a copy to the Bridge Inspection Engineer. See attachment 4-24.

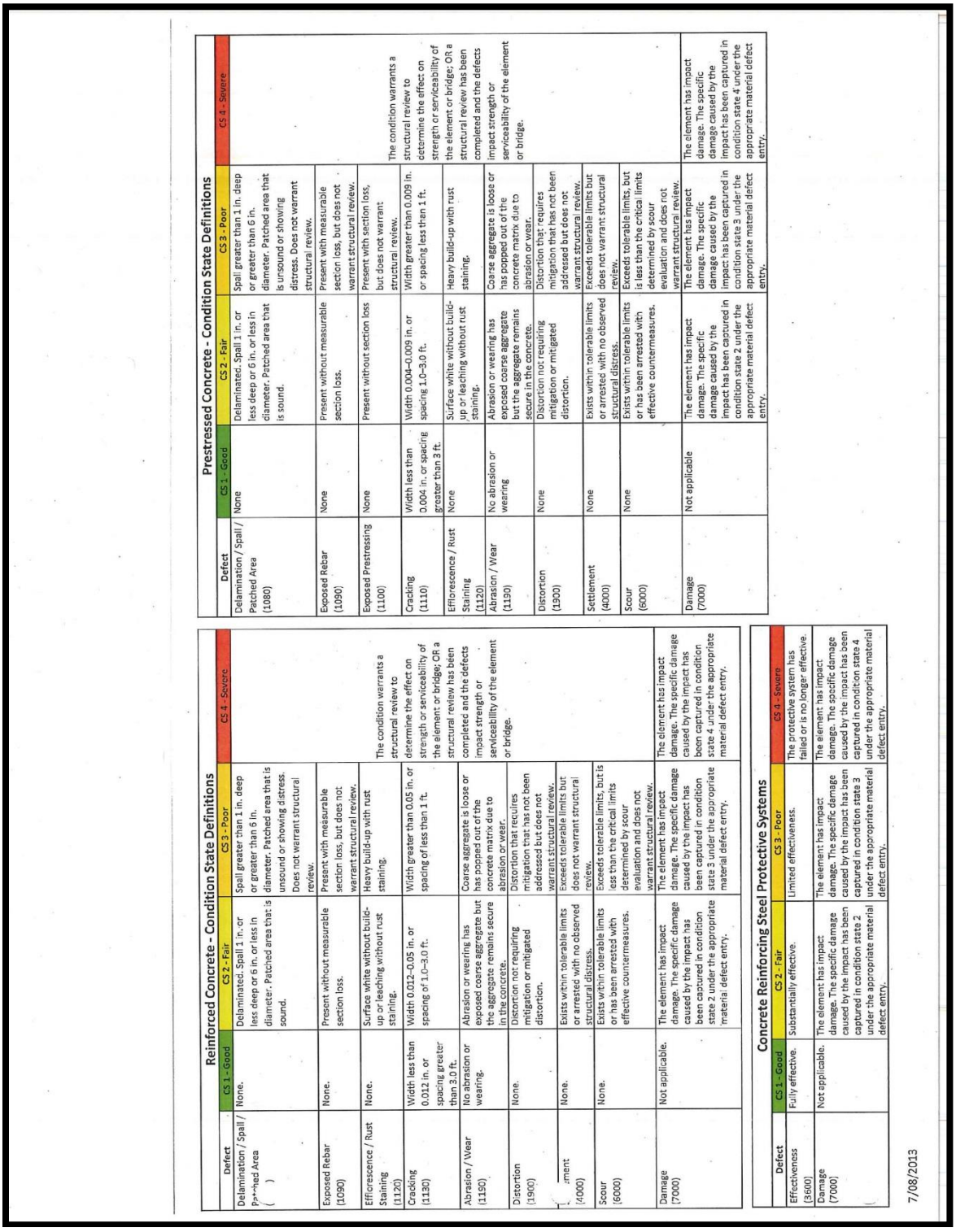
* Cover letter attachments shown being signed by the DHD are intended to have the minimum language required, the District have the right to add additional language as they see fit.

4.12 ABIE REVIEW OF COMPLETED INSPECTION REPORTS

Upon receiving the reviewed inspection reports from the DBIE, the ABIE shall review 100% of the inspection reports with numerical condition ratings of 4 or less on Items 58, 59, 60, or 62. Also the ABIE shall review a minimum of 10% of all reports for completeness. Upon completion of the review by the ABIE, he/she will check off in 4D whether the review was a regular review or an in depth review. Upon completion of the ABIE's review, the ABIE shall place the accepted inspection report into the Boston Bridge history file.

If an inspection report is rejected by the ABIE, the ABIE shall return the inspection report to the DBIE with comments, so that they may forward the rejected inspection report to the Team Leader for revision. When the rejection comments have been addressed, the Team Leader will then resubmit the inspection report to the DBIE for review, who will concur and accept the inspection report in 4D and then resubmit the report to the ABIE.

4.13 CHAPTER 4 ATTACHMENTS



Prestressed Concrete - Condition State Definitions

Defect	CS 1 - Good	CS 2 - Fair	CS 3 - Poor	CS 4 - Severe
Delamination / Spall / Patched Area (1080)	None	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Exposed Prestressing (1100)	None	Present without section loss	Present with section loss, but does not warrant structural review.	
Cracking (1110)	Width less than 0.004 in. or spacing greater than 3 ft.	Width 0.004–0.009 in. or spacing 1.0–3.0 ft.	Width greater than 0.009 in. or spacing less than 1 ft.	
Efflorescence / Rust Staining (1120)	None	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Abrasion / Wear (1130)	No abrasion or wearing	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	
Distortion (1900)	None	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

Reinforced Concrete - Condition State Definitions

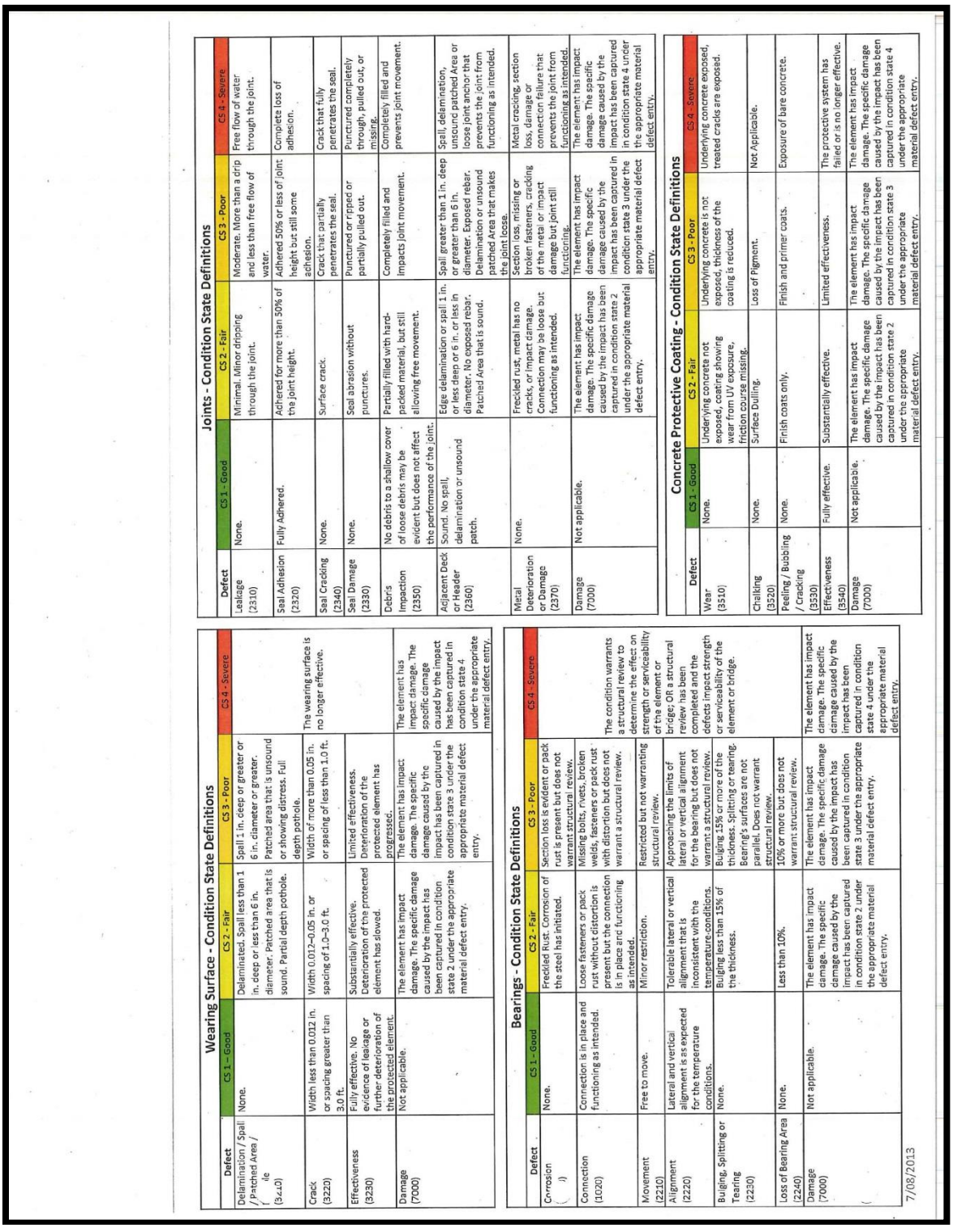
Defect	CS 1 - Good	CS 2 - Fair	CS 3 - Poor	CS 4 - Severe
Delamination / Spall / Patched Area ( )	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090)	None.	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Efflorescence / Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (1130)	Width less than 0.012 in. or spacing greater than 3.0 ft.	Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.	Width greater than 0.05 in. or spacing of less than 1 ft.	
Abrasion / Wear (1190)	No abrasion or wearing.	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
ment (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

Concrete Reinforcing Steel Protective Systems

Defect	CS 1 - Good	CS 2 - Fair	CS 3 - Poor	CS 4 - Severe
Effectiveness (3600)	Fully effective.	Substantially effective.	Limited effectiveness.	The protective system has failed or is no longer effective.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

7/08/2013

Attachment 4-1: Quick Reference Guide for the Element Level Condition States, Page 1 of 5



Wearing Surface - Condition State Definitions

Defect	CS 1 - Good	CS 2 - Fair	CS 3 - Poor	CS 4 - Severe
Delamination / Spall / Patched Area / (3210)	None.	Delaminated. Spall less than 1 in. deep or less than 6 in. diameter. Patched area that is sound. Partial depth pothole.	Spall 1 in. deep or greater or 6 in. diameter or greater. Patched area that is unsound or showing distress. Full depth pothole.	The wearing surface is no longer effective.
Crack (3220)	Width less than 0.012 in. or spacing greater than 3.0 ft.	Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.	Width of more than 0.05 in. or spacing of less than 1.0 ft.	
Effectiveness (3230)	Fully effective. No evidence of leakage or further deterioration of the protected element.	Substantially effective. Deterioration of the protected element has slowed.	Limited effectiveness. Deterioration of the protected element has progressed.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

Bearings - Condition State Definitions

Defect	CS 1 - Good	CS 2 - Fair	CS 3 - Poor	CS 4 - Severe
Corrosion ( )	None.	Freckled Rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, broken welds, fasteners or pack rust with distortion but does not warrant a structural review.	
Movement (2210)	Free to move.	Minor restriction.	Restricted but not warranting structural review.	
Alignment (2220)	Lateral and vertical alignment is as expected for the temperature conditions.	Tolerable lateral or vertical alignment that is inconsistent with the temperature conditions.	Approaching the limits of lateral or vertical alignment for the bearing but does not warrant a structural review.	
Bulging, Splitting or Tearing (2230)	None.	Bulging less than 15% of the thickness.	Bulging 15% or more of the thickness. Splitting or tearing. Bearing's surfaces are not parallel. Does not warrant structural review.	
Loss of Bearing Area (2240)	None.	Less than 10%.	10% or more but does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

Joints - Condition State Definitions

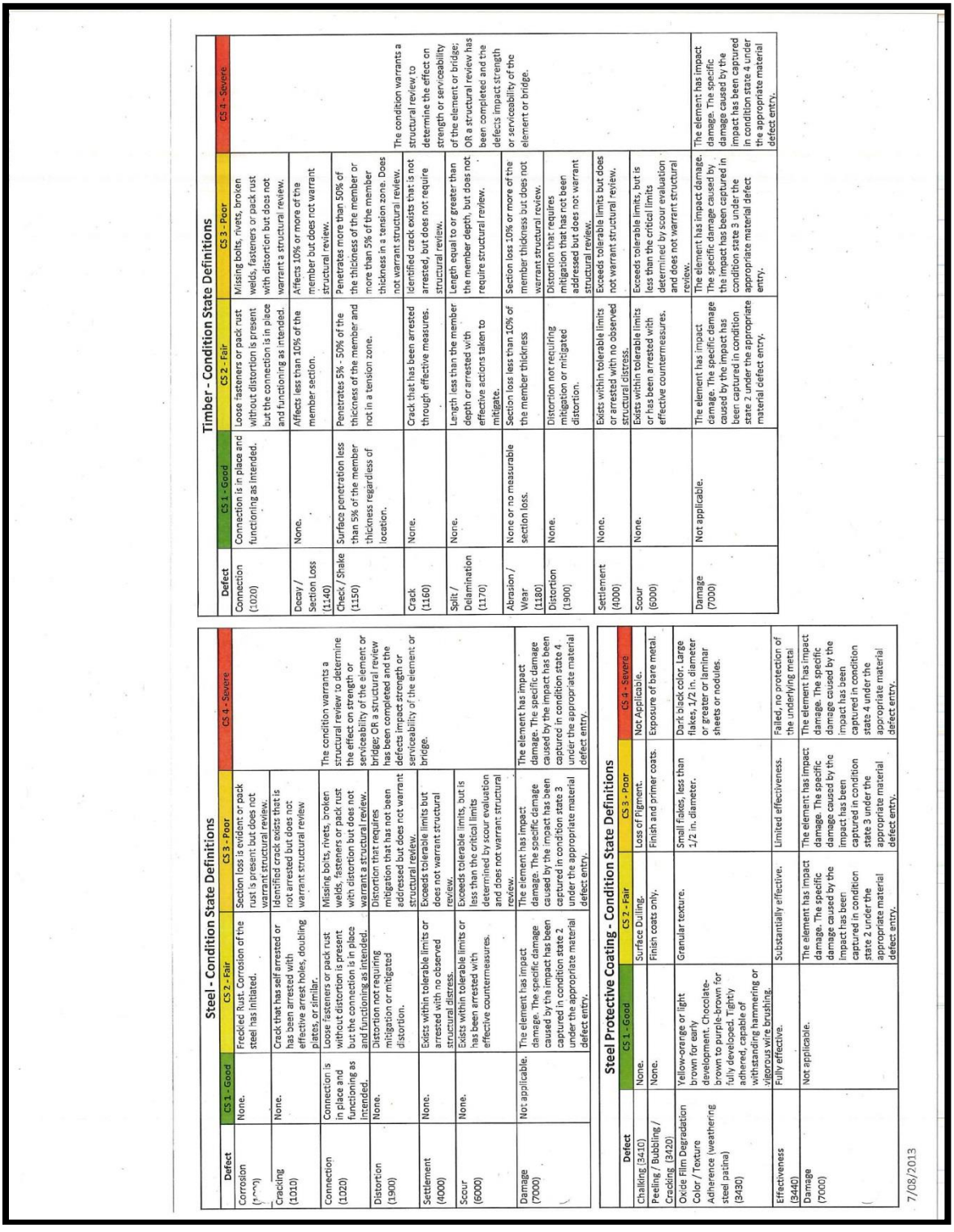
Defect	CS 1 - Good	CS 2 - Fair	CS 3 - Poor	CS 4 - Severe
Leakage (2310)	None.	Minimal. Minor dripping through the joint.	Moderate. More than a drip and less than free flow of water.	Free flow of water through the joint.
Seal Adhesion (2320)	Fully Adhered.	Adhered for more than 50% of the joint height.	Adhered 50% or less of joint height but still some adhesion.	Complete loss of adhesion.
Seal Cracking (2340)	None.	Surface crack.	Crack that partially penetrates the seal.	Crack that fully penetrates the seal.
Seal Damage (2330)	None.	Seal abrasion without punctures.	Punctured or ripped or partially pulled out.	Punctured completely through, pulled out, or missing.
Debris Impaction (2350)	No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint.	Partially filled with hard-packed material, but still allowing free movement.	Completely filled and impacts joint movement.	Completely filled and prevents joint movement.
Adjacent Deck or Header (2360)	Sound. No spall, delamination or unsound patch.	Edge delamination or spall 1 in. or less deep or 6 in. or less in diameter. No exposed rebar. Patched Area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Exposed rebar. Delamination or unsound patched Area that makes the joint loose.	Spall, delamination, unsound patched Area or loose joint anchor that prevents the joint from functioning as intended.
Metal Deterioration or Damage (2370)	None.	Freckled rust, metal has no cracks, or impact damage. Connection may be loose but functioning as intended.	Section loss, missing or broken fasteners, cracking of the metal or impact damage but joint still functioning.	Metal cracking, section loss, damage or connection failure that prevents the joint from functioning as intended.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

Concrete Protective Coating - Condition State Definitions

Defect	CS 1 - Good	CS 2 - Fair	CS 3 - Poor	CS 4 - Severe
Wear (3510)	None.	Underlying concrete not exposed, coating showing wear from UV exposure, friction course missing.	Underlying concrete is not exposed, thickness of the coating is reduced.	Underlying concrete exposed, treated cracks are exposed.
Chalking (3520)	None.	Surface Dulling.	Loss of Pigment.	Not Applicable.
Peeling / Bubbling / Cracking (3530)	None.	Finish coats only.	Finish and primer coats.	Exposure of bare concrete.
Effectiveness (3540)	Fully effective.	Substantially effective.	Limited effectiveness.	The protective system has failed or is no longer effective.
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

7/08/2013

Attachment 4-1: Quick Reference Guide for the Element Level Condition States, Page 2 of 5



Steel - Condition State Definitions

Defect	CS 1 - Good	CS 2 - Fair	CS 3 - Poor	CS 4 - Severe
Corrosion (1000)	None.	Freckled Rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, broken welds, fasteners or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

Timber - Condition State Definitions

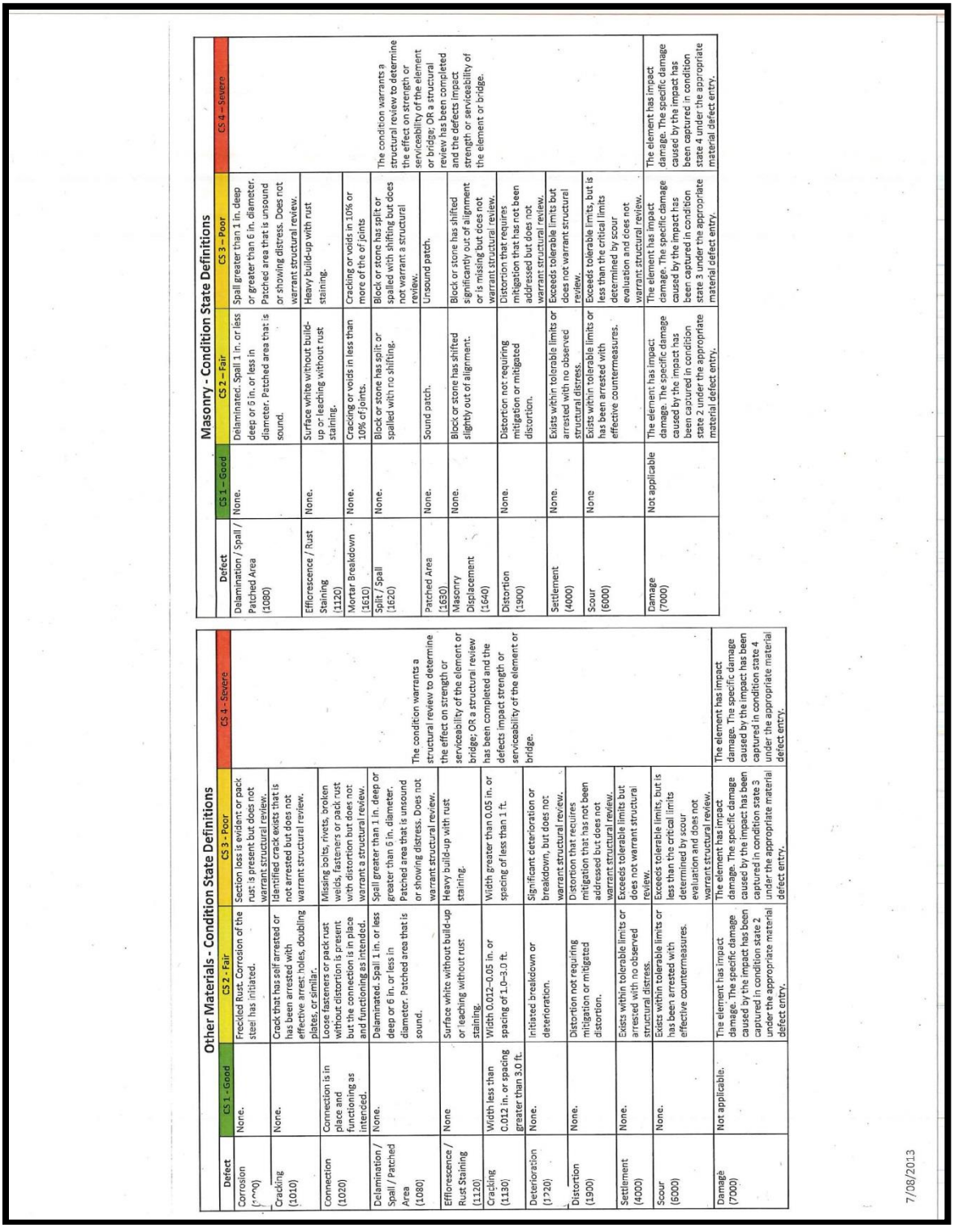
Defect	CS 1 - Good	CS 2 - Fair	CS 3 - Poor	CS 4 - Severe
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, broken welds, fasteners or pack rust with distortion but does not warrant a structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Decay / Section Loss (1140)	None.	Affects less than 10% of the member section.	Affects 10% or more of the member but does not warrant structural review.	
Check / Shake (1150)	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5% - 50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.	
Crack (1160)	None.	Crack that has been arrested through effective measures.	Identified crack exists that is not arrested, but does not require structural review.	
Split / Delamination (1170)	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length equal to or greater than the member depth, but does not require structural review.	
Abrasion / Wear (1180)	None or no measurable section loss.	Section loss less than 10% of the member thickness	Section loss 10% or more of the member thickness but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

Steel Protective Coating - Condition State Definitions

Defect	CS 1 - Good	CS 2 - Fair	CS 3 - Poor	CS 4 - Severe
Chalking (3410)	None.	Surface Dulling.	Loss of Pigment.	Not Applicable.
Peeling / Bubbling / Cracking (3420)	None.	Finish coats only.	Finish and primer coats.	Exposure of bare metal.
Oxide Film Degradation Color / Texture Adherence (weathering steel patina) (3430)	Yellow-orange or light brown for early development. Chocolate-brown to purple-brown for fully developed. Tightly adhered, capable of withstanding hammering or vigorous wire brushing.	Granular texture.	Small flakes, less than 1/2 in. diameter.	Dark black color. Large flakes, 1/2 in. diameter or greater or laminar sheets or nodules.
Effectiveness (3440)	Fully effective.	Substantially effective.	Limited effectiveness.	Failed, no protection of the underlying metal
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

7/08/2013

Attachment 4-1: Quick Reference Guide for the Element Level Condition States, Page 3 of 5



Other Materials - Condition State Definitions

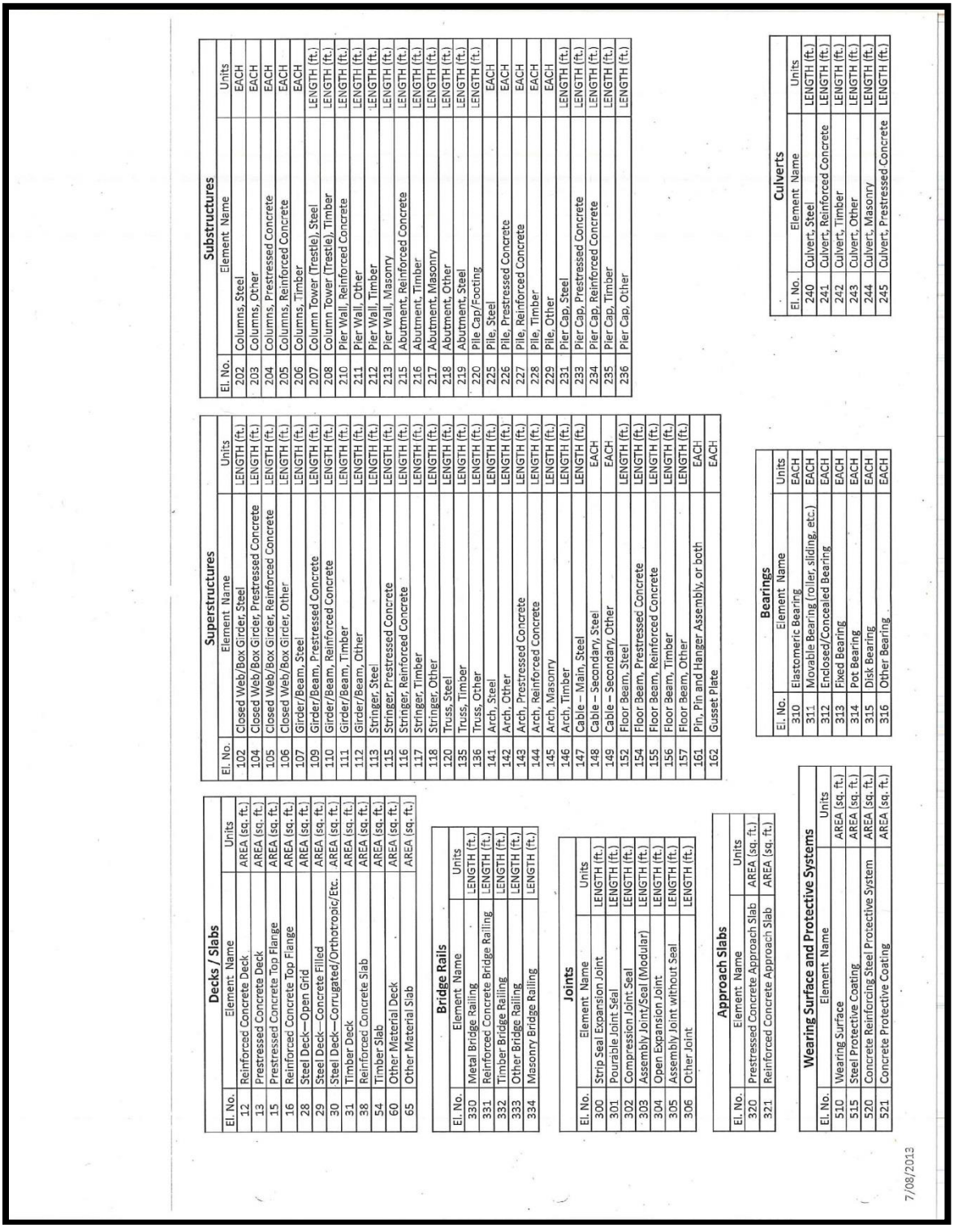
Defect	CS 1 - Good	CS 2 - Fair	CS 3 - Poor	CS 4 - Severe
Corrosion (1090)	None.	Freckled Rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, broken welds, fasteners or pack rust with distortion but does not warrant a structural review.	
Delamination / Spall / Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence / Rust Staining (1120)	None	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking (1130)	Width less than 0.012 in. or spacing greater than 3.0 ft.	Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.	Width greater than 0.05 in. or spacing of less than 1 ft.	
Deterioration (1720)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

Masonry - Condition State Definitions

Defect	CS 1 – Good	CS 2 – Fair	CS 3 – Poor	CS 4 – Severe
Delamination / Spall / Patched Area (1080)	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Efflorescence / Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Mortar Breakdown (1610)	None.	Cracking or voids in less than 10% of joints.	Cracking or voids in 10% or more of the of joints	
Split / Spall (1620)	None.	Block or stone has split or spalled with no shifting.	Block or stone has split or spalled with shifting but does not warrant a structural review.	
Patched Area (1630)	None.	Sound patch.	Unsound patch.	
Masonry Displacement (1640)	None.	Block or stone has shifted slightly out of alignment.	Block or stone has shifted significantly out of alignment or is missing but does not warrant structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage (7000)	Not applicable	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

7/08/2013

Attachment 4-1: Quick Reference Guide for the Element Level Condition States, Page 4 of 5



Decks / Slabs

El. No.	Element Name	Units
12	Reinforced Concrete Deck	AREA (sq. ft.)
13	Prestressed Concrete Deck	AREA (sq. ft.)
15	Prestressed Concrete Top Flange	AREA (sq. ft.)
16	Reinforced Concrete Top Flange	AREA (sq. ft.)
28	Steel Deck—Open Grid	AREA (sq. ft.)
29	Steel Deck—Concrete Filled	AREA (sq. ft.)
30	Steel Deck—Corrugated/Orthotropic/Etc.	AREA (sq. ft.)
31	Timber Deck	AREA (sq. ft.)
38	Reinforced Concrete Slab	AREA (sq. ft.)
54	Timber Slab	AREA (sq. ft.)
60	Other Material Deck	AREA (sq. ft.)
65	Other Material Slab	AREA (sq. ft.)

Bridge Rails

El. No.	Element Name	Units
330	Metal Bridge Railing	LENGTH (ft.)
331	Reinforced Concrete Bridge Railing	LENGTH (ft.)
332	Timber Bridge Railing	LENGTH (ft.)
333	Other Bridge Railing	LENGTH (ft.)
334	Masonry Bridge Railing	LENGTH (ft.)

Joints

El. No.	Element Name	Units
300	Strip Seal Expansion Joint	LENGTH (ft.)
301	Pourable Joint Seal	LENGTH (ft.)
302	Compression Joint Seal	LENGTH (ft.)
303	Assembly Joint/Seal (Modular)	LENGTH (ft.)
304	Open Expansion Joint	LENGTH (ft.)
305	Assembly Joint without Seal	LENGTH (ft.)
306	Other Joint	LENGTH (ft.)

Approach Slabs

El. No.	Element Name	Units
320	Prestressed Concrete Approach Slab	AREA (sq. ft.)
321	Reinforced Concrete Approach Slab	AREA (sq. ft.)

Wearing Surface and Protective Systems

El. No.	Element Name	Units
510	Wearing Surface	AREA (sq. ft.)
515	Steel Protective Coating	AREA (sq. ft.)
520	Concrete Reinforcing Steel Protective System	AREA (sq. ft.)
521	Concrete Protective Coating	AREA (sq. ft.)

Superstructures

El. No.	Element Name	Units
102	Closed Web/Box Girder, Steel	LENGTH (ft.)
104	Closed Web/Box Girder, Prestressed Concrete	LENGTH (ft.)
105	Closed Web/Box Girder, Reinforced Concrete	LENGTH (ft.)
106	Closed Web/Box Girder, Other	LENGTH (ft.)
107	Girder/Beam, Steel	LENGTH (ft.)
109	Girder/Beam, Prestressed Concrete	LENGTH (ft.)
110	Girder/Beam, Reinforced Concrete	LENGTH (ft.)
111	Girder/Beam, Timber	LENGTH (ft.)
112	Girder/Beam, Other	LENGTH (ft.)
113	Stringer, Steel	LENGTH (ft.)
115	Stringer, Prestressed Concrete	LENGTH (ft.)
116	Stringer, Reinforced Concrete	LENGTH (ft.)
117	Stringer, Timber	LENGTH (ft.)
118	Stringer, Other	LENGTH (ft.)
120	Truss, Steel	LENGTH (ft.)
135	Truss, Timber	LENGTH (ft.)
136	Truss, Other	LENGTH (ft.)
141	Arch, Steel	LENGTH (ft.)
142	Arch, Other	LENGTH (ft.)
143	Arch, Prestressed Concrete	LENGTH (ft.)
144	Arch, Reinforced Concrete	LENGTH (ft.)
145	Arch, Masonry	LENGTH (ft.)
146	Arch, Timber	LENGTH (ft.)
147	Cable – Main, Steel	LENGTH (ft.)
148	Cable – Secondary, Steel	EACH
149	Cable – Secondary, Other	EACH
152	Floor Beam, Steel	LENGTH (ft.)
154	Floor Beam, Prestressed Concrete	LENGTH (ft.)
155	Floor Beam, Reinforced Concrete	LENGTH (ft.)
156	Floor Beam, Timber	LENGTH (ft.)
157	Floor Beam, Other	LENGTH (ft.)
161	Pin, Pin and Hanger Assembly, or both	EACH
162	Gusset Plate	EACH

Bearings

El. No.	Element Name	Units
310	Elastomeric Bearing	EACH
311	Movable Bearing (roller, sliding, etc.)	EACH
312	Enclosed/Concealed Bearing	EACH
313	Fixed Bearing	EACH
314	Pot Bearing	EACH
315	Disk Bearing	EACH
316	Other Bearing	EACH

Substructures

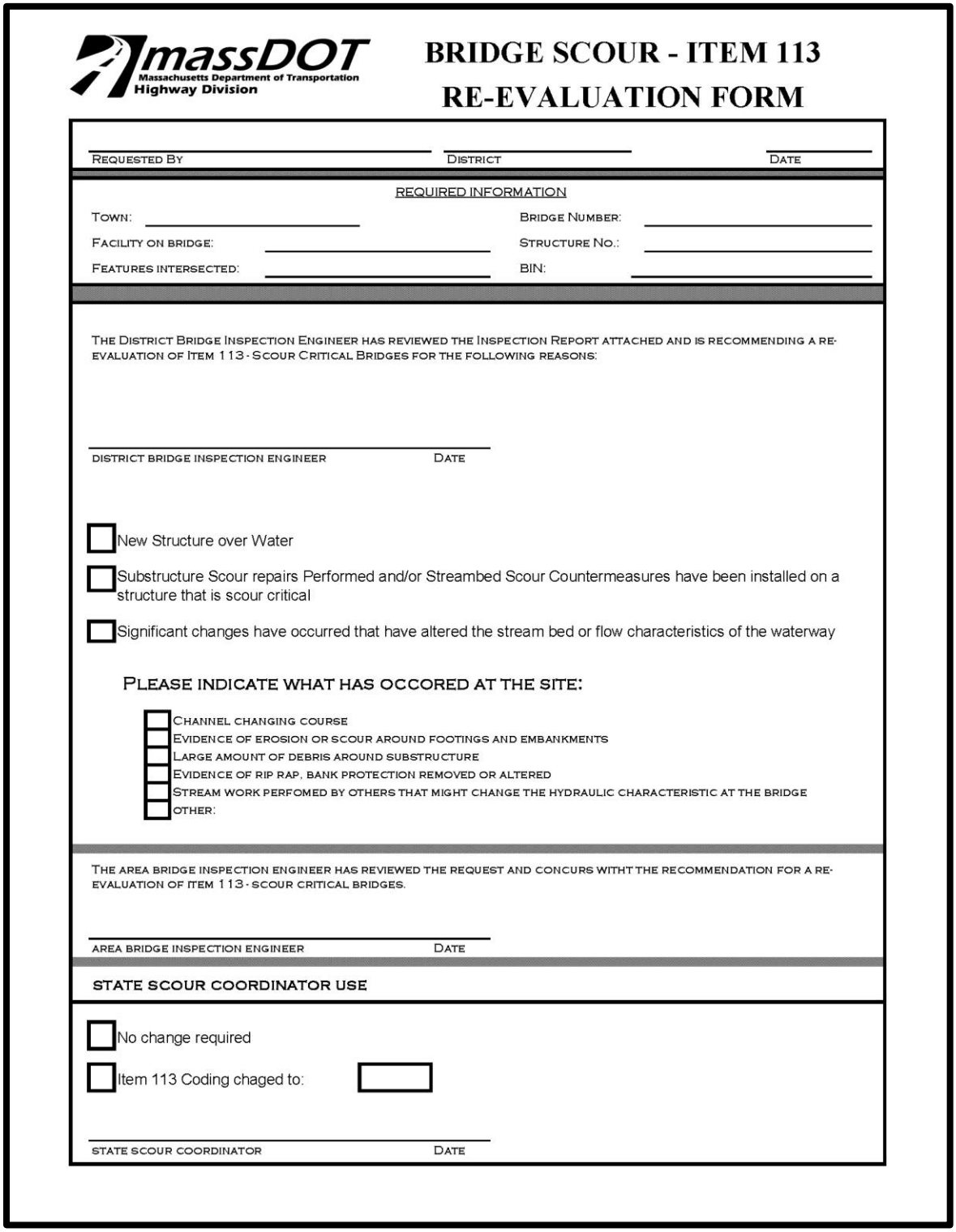
El. No.	Element Name	Units
202	Columns, Steel	EACH
203	Columns, Other	EACH
204	Columns, Prestressed Concrete	EACH
205	Columns, Reinforced Concrete	EACH
206	Columns, Timber	EACH
207	Column Tower (Trestle), Steel	LENGTH (ft.)
208	Column Tower (Trestle), Timber	LENGTH (ft.)
210	Pier Wall, Reinforced Concrete	LENGTH (ft.)
211	Pier Wall, Other	LENGTH (ft.)
212	Pier Wall, Timber	LENGTH (ft.)
213	Pier Wall, Masonry	LENGTH (ft.)
215	Abutment, Reinforced Concrete	LENGTH (ft.)
216	Abutment, Timber	LENGTH (ft.)
217	Abutment, Masonry	LENGTH (ft.)
218	Abutment, Other	LENGTH (ft.)
219	Abutment, Steel	LENGTH (ft.)
220	Pile Cap/Footing	LENGTH (ft.)
225	Pile, Steel	EACH
226	Pile, Prestressed Concrete	EACH
227	Pile, Reinforced Concrete	EACH
228	Pile, Timber	EACH
229	Pile, Other	EACH
231	Pier Cap, Steel	LENGTH (ft.)
233	Pier Cap, Prestressed Concrete	LENGTH (ft.)
234	Pier Cap, Reinforced Concrete	LENGTH (ft.)
235	Pier Cap, Timber	LENGTH (ft.)
236	Pier Cap, Other	LENGTH (ft.)

Culverts

El. No.	Element Name	Units
240	Culvert, Steel	LENGTH (ft.)
241	Culvert, Reinforced Concrete	LENGTH (ft.)
242	Culvert, Timber	LENGTH (ft.)
243	Culvert, Other	LENGTH (ft.)
244	Culvert, Masonry	LENGTH (ft.)
245	Culvert, Prestressed Concrete	LENGTH (ft.)

7/08/2013

Attachment 4-1: Quick Reference Guide for the Element Level Condition States, Page 5 of 5



massDOT
Massachusetts Department of Transportation
Highway Division

BRIDGE SCOUR - ITEM 113
RE-EVALUATION FORM

REQUESTED BY _____ DISTRICT _____ DATE _____

REQUIRED INFORMATION

TOWN: _____ BRIDGE NUMBER: _____

FACILITY ON BRIDGE: _____ STRUCTURE NO.: _____

FEATURES INTERSECTED: _____ BIN: _____

THE DISTRICT BRIDGE INSPECTION ENGINEER HAS REVIEWED THE INSPECTION REPORT ATTACHED AND IS RECOMMENDING A RE-EVALUATION OF ITEM 113 - SCOUR CRITICAL BRIDGES FOR THE FOLLOWING REASONS:

_____
DISTRICT BRIDGE INSPECTION ENGINEER DATE

☐ New Structure over Water

☐ Substructure Scour repairs Performed and/or Streambed Scour Countermeasures have been installed on a structure that is scour critical

☐ Significant changes have occurred that have altered the stream bed or flow characteristics of the waterway

PLEASE INDICATE WHAT HAS OCCORED AT THE SITE:

- ☐ CHANNEL CHANGING COURSE
- ☐ EVIDENCE OF EROSION OR SCOUR AROUND FOOTINGS AND EMBANKMENTS
- ☐ LARGE AMOUNT OF DEBRIS AROUND SUBSTRUCTURE
- ☐ EVIDENCE OF RIP RAP, BANK PROTECTION REMOVED OR ALTERED
- ☐ STREAM WORK PERFOMED BY OTHERS THAT MIGHT CHANGE THE HYDRAULIC CHARACTERISTIC AT THE BRIDGE
- ☐ OTHER:

THE AREA BRIDGE INSPECTION ENGINEER HAS REVIEWED THE REQUEST AND CONCURS WITHT THE RECOMMENDATION FOR A RE-EVALUATION OF ITEM 113 - SCOUR CRITICAL BRIDGES.

_____
AREA BRIDGE INSPECTION ENGINEER DATE

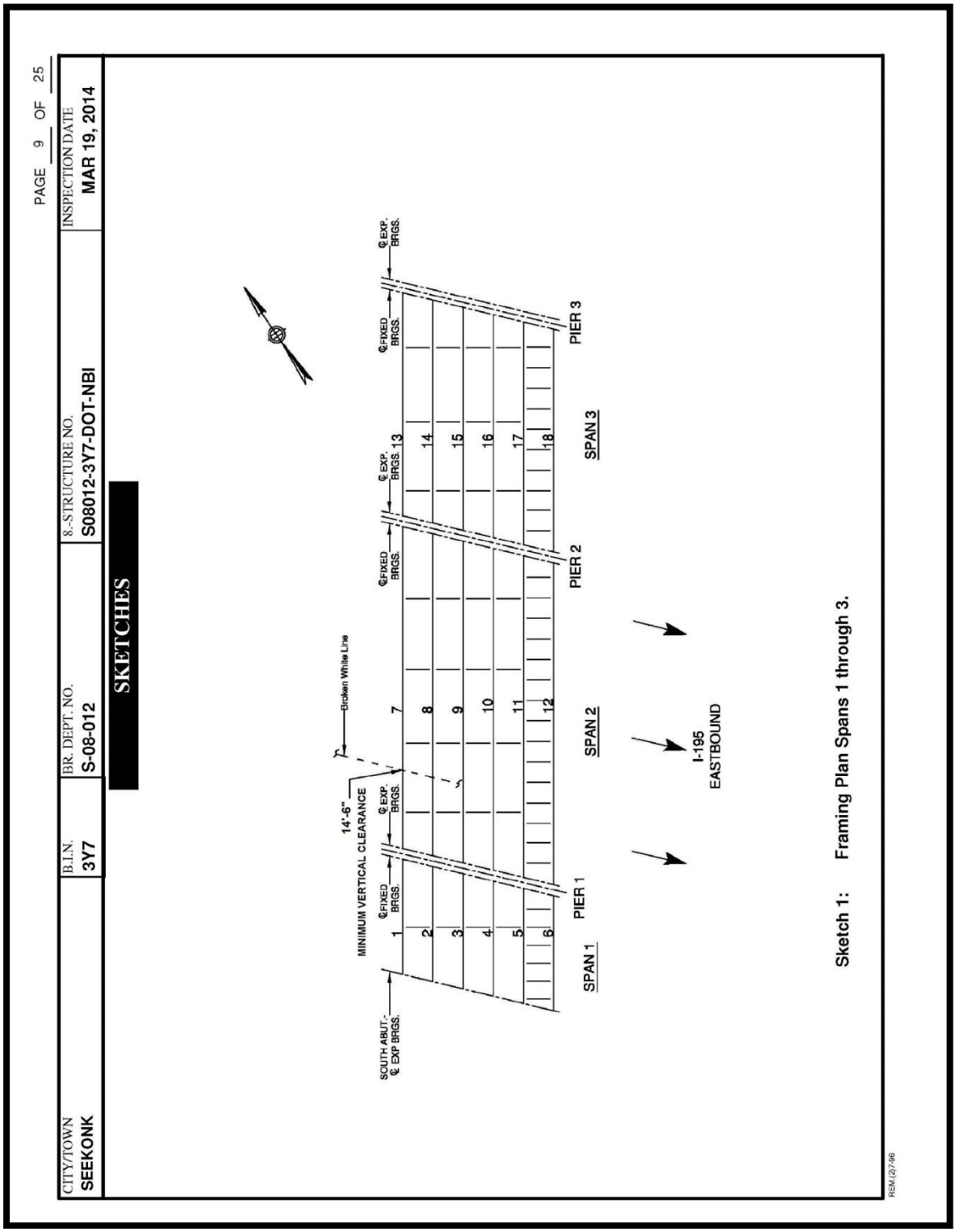
STATE SCOUR COORDINATOR USE

☐ No change required

☐ Item 113 Coding chaged to: ☐

_____
STATE SCOUR COORDINATOR DATE

Attachment 4-2: Bridge Scour – Item 113 Re-evaluation Form



Attachment 4-3: Vertical Clearance Location Placed on a Framing Plan

Traffic Count Formula for use when MassDOT Traffic Volumes are not provided.

Definitions:

Rush Hour = 3hrs A.M. + 3hrs. P.M. = 6 hrs (7 AM – 10 AM & 3 PM – 6 PM)
Off-Peak = Early AM = 3 hrs (4 AM – 7 AM)
Remaining = = 15 hrs (10 AM – 3 PM & 6 PM – 4 AM)
= 24 hrs

Off - Peak carries no traffic

Rush hour (6)hrs = 42% ADT
Remaining (15)hrs = 58% ADT

Instructions :

Take twelve minute counts and extrapolate according to the above. Document and note actual time count was made. If 12 minute counts are used then a factor of **5** will be used to make the counts per hour i.e. 5X12 = 60 min = 1 hour

Example #1

Counts where taken at 11:00 AM for 12 minutes the total vehicles counted was 50. Find the ADT.

50 cars X 5(factor to convert to per hour) X 15(counts taken at outside rush hour) = 3750 cars/hr

Therefore, 3750/.58 = 6466 ADT Round up to 6500 ADT

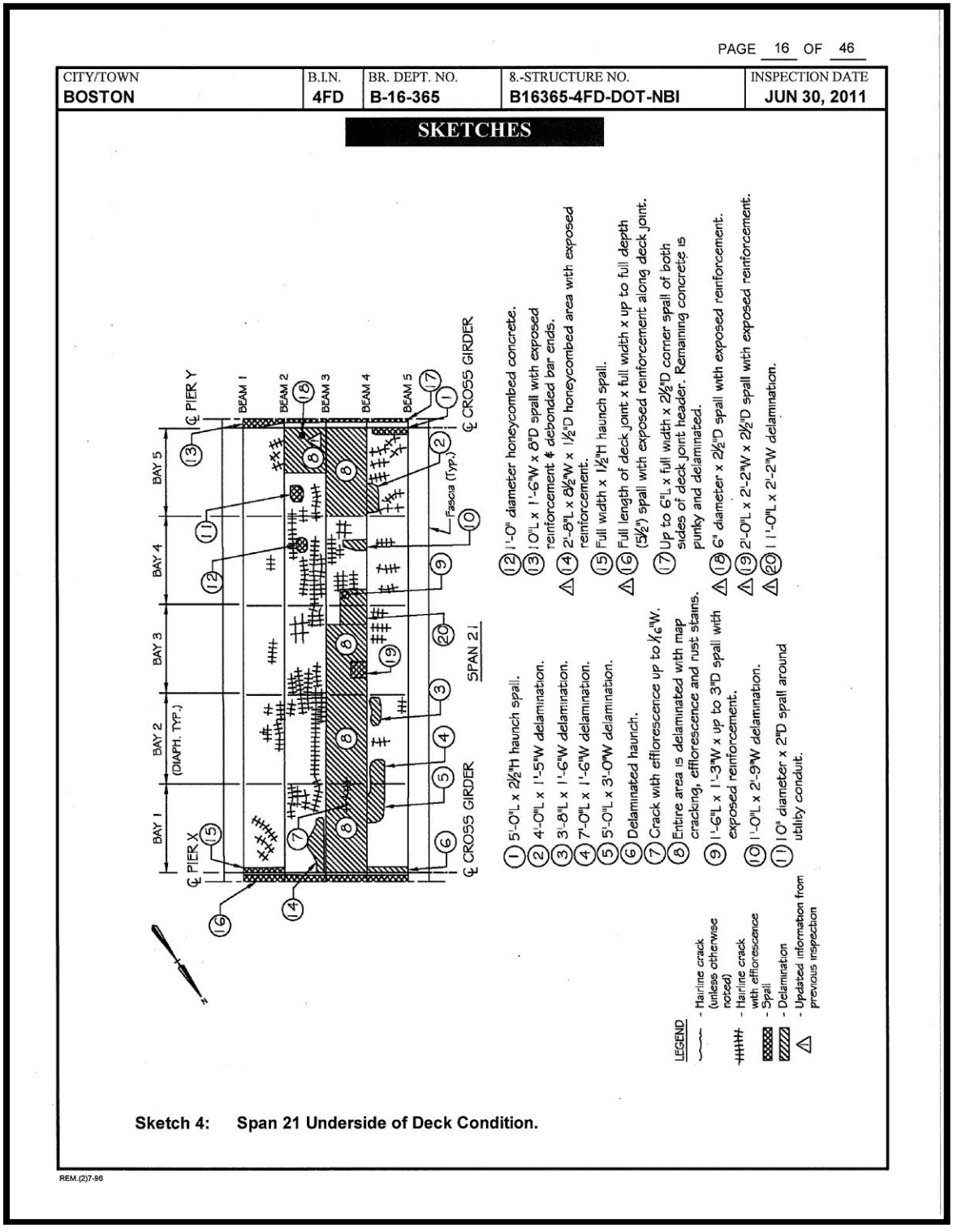
Example #2

Counts where taken at 9:00 AM for 12 minutes the total vehicles counted was 75. Find the ADT.

75 X 5 = 375 cars/ hr
375 X 6 = 2250 cars

Therefore, 2250/ .42 = 5357 ADT Round up to 5400 ADT

Attachment 4-4: Average Daily Traffic Count Formulas & Example Calculations



PAGE 16 OF 46

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BOSTON	4FD	B-16-365	B16365-4FD-DOT-NBI	JUN 30, 2011

SKETCHES

① 5'-0"L x 2½"H haunch spall.
② 4'-0"L x 1'-5"W delamination.
③ 3'-8"L x 1'-6"W delamination.
④ 7'-0"L x 1'-6"W delamination.
⑤ 5'-0"L x 3'-0"W delamination.
⑥ Delaminated haunch.
⑦ Crack with efflorescence up to ⅛"W.
⑧ Entire area is delaminated with map cracking, efflorescence and rust stains.
⑨ 1'-6"L x 1'-3"W x up to 3"D spall with exposed reinforcement.
⑩ 1'-0"L x 2'-9"W delamination.
⑪ 10" diameter x 2"D spall around utility conduit.
⑫ 1'-0" diameter honeycombed concrete.
⑬ 10"L x 1'-6"W x 8"D spall with exposed reinforcement & debonded bar ends.
△ ⑭ 2'-8"L x 8½"W x 1½"D honeycombed area with exposed reinforcement.
⑮ Full width x 1½"H haunch spall.
△ ⑯ Full length of deck joint x full width x up to full depth (5½") spall with exposed reinforcement along deck joint.
⑰ Up to 6"L x full width x 2½"D corner spall of both sides of deck joint header. Remaining concrete is punky and delaminated.
△ ⑱ 6" diameter x 2½"D spall with exposed reinforcement.
△ ⑲ 2'-0"L x 2'-2"W x 2½"D spall with exposed reinforcement.
△ ⑳ 1'-0"L x 2'-2"W delamination.

LEGEND
~~~ - Hairline crack (unless otherwise noted)
+++++ - Hairline crack with efflorescence
▩ - Spall
▨ - Delamination
△ - Updated information from previous inspection

Sketch 4: Span 21 Underside of Deck Condition.

REM.(2)7-96

Attachment 4-5: Typical Underside of Deck Condition Sketch
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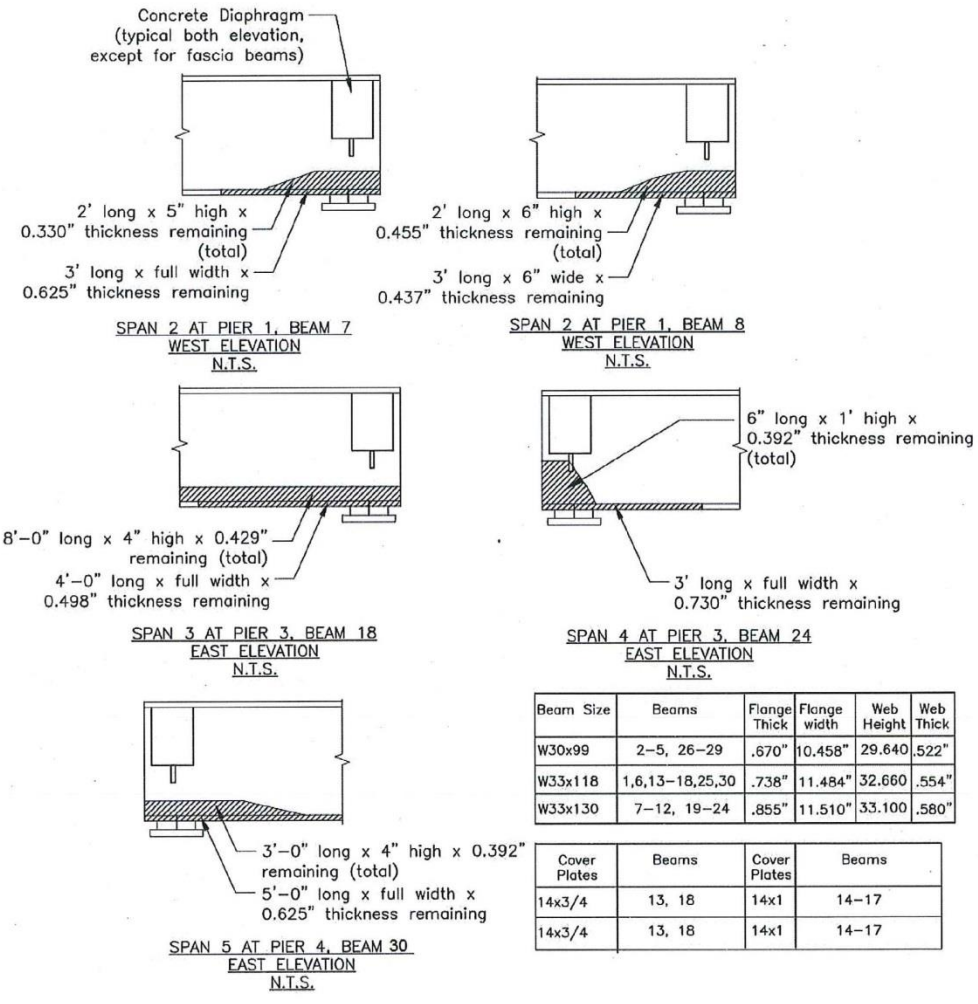
PAGE 11 OF 24

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
NORTH ATTLEBORO	3Y5	N-16-052	N16052-3Y5-DOT-NBI	DEC 31, 2013

SKETCHES



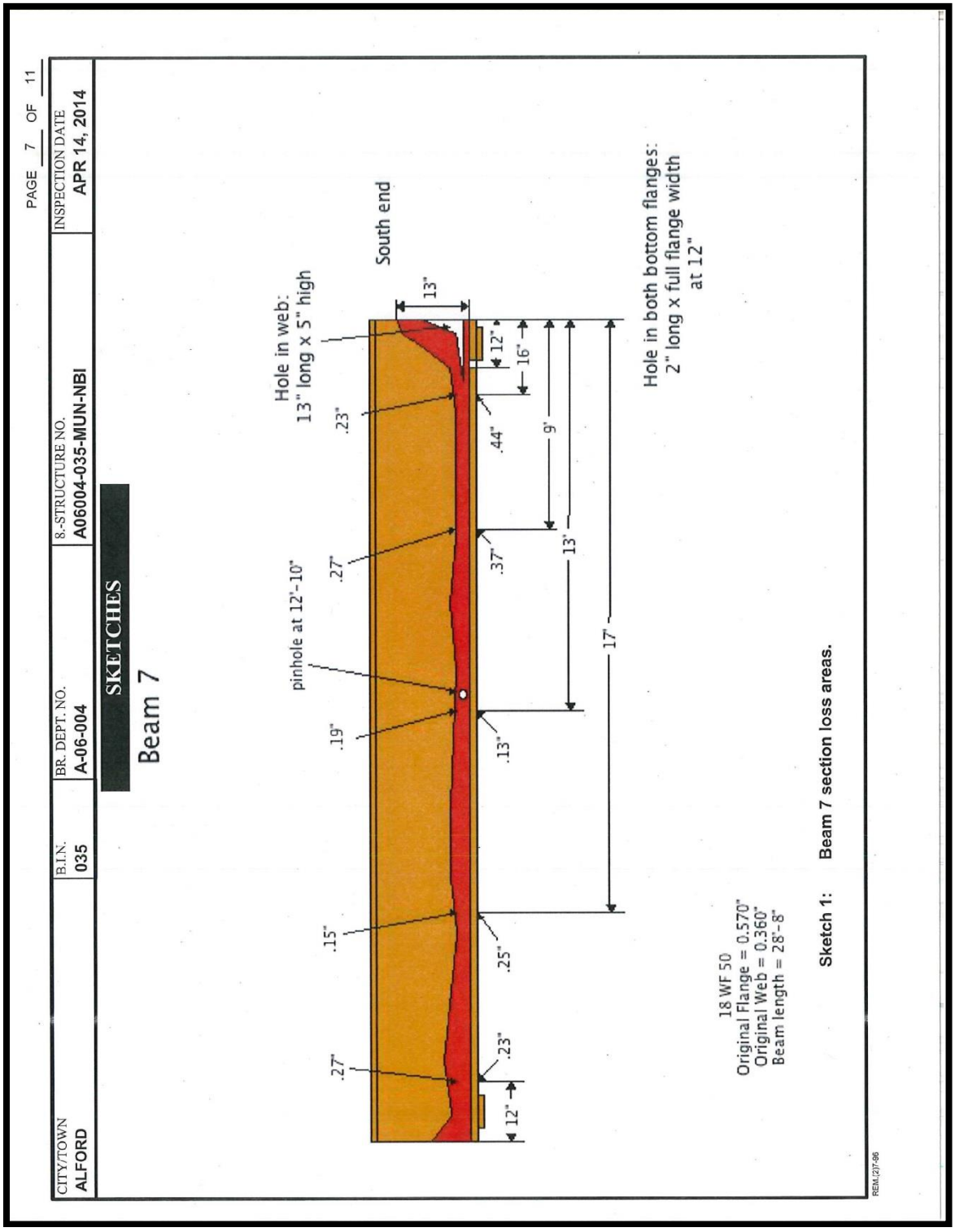
Beam Size	Beams	Flange Thick	Flange width	Web Height	Web Thick
W30x99	2–5, 26–29	.670"	10.458"	29.640	.522"
W33x118	1,6,13–18,25,30	.738"	11.484"	32.660	.554"
W33x130	7–12, 19–24	.855"	11.510"	33.100	.580"

Cover Plates	Beams	Cover Plates	Beams
14x3/4	13, 18	14x1	14–17
14x3/4	13, 18	14x1	14–17

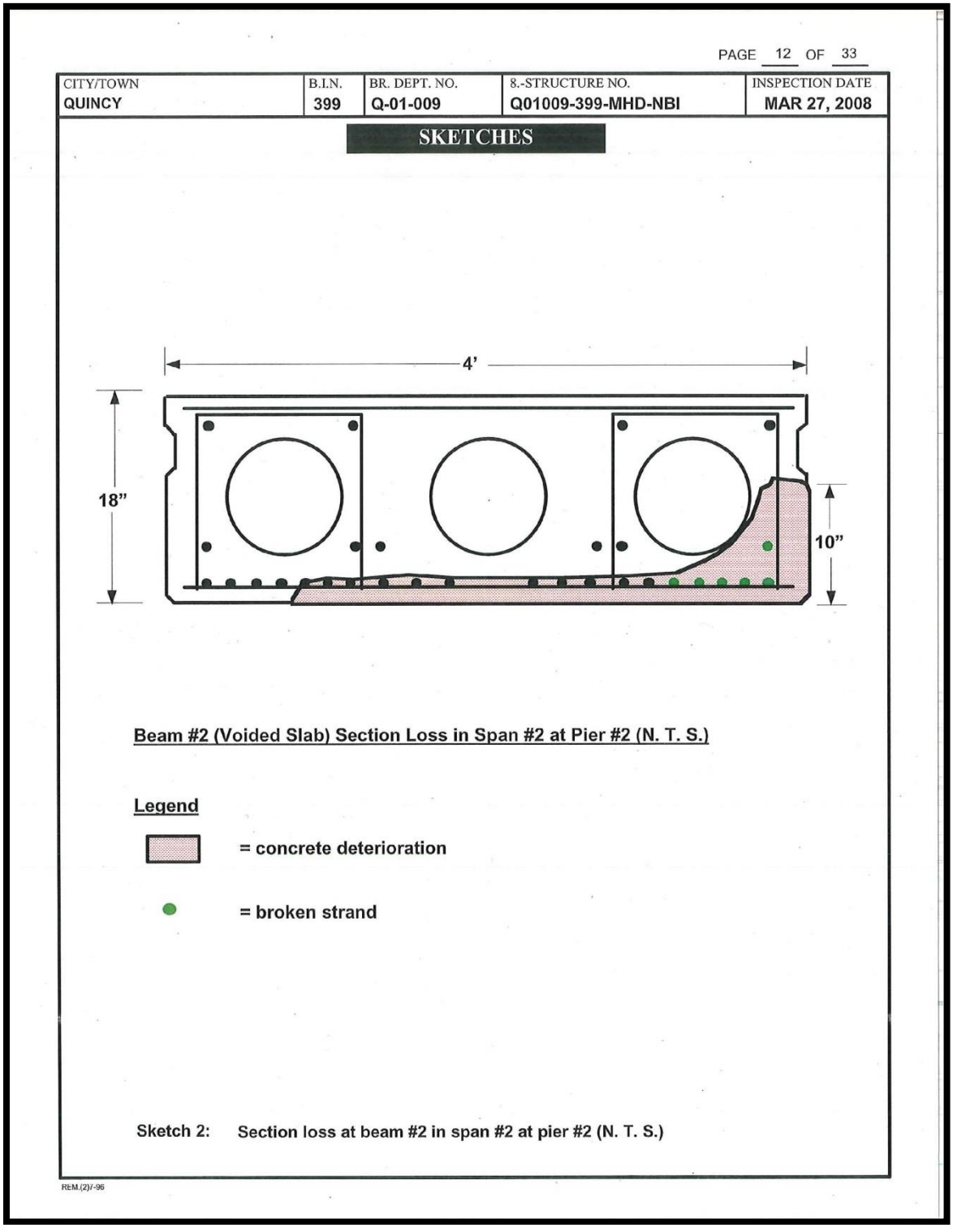
Sketch 3: Section Losses at Beams

REM.(2)7-96

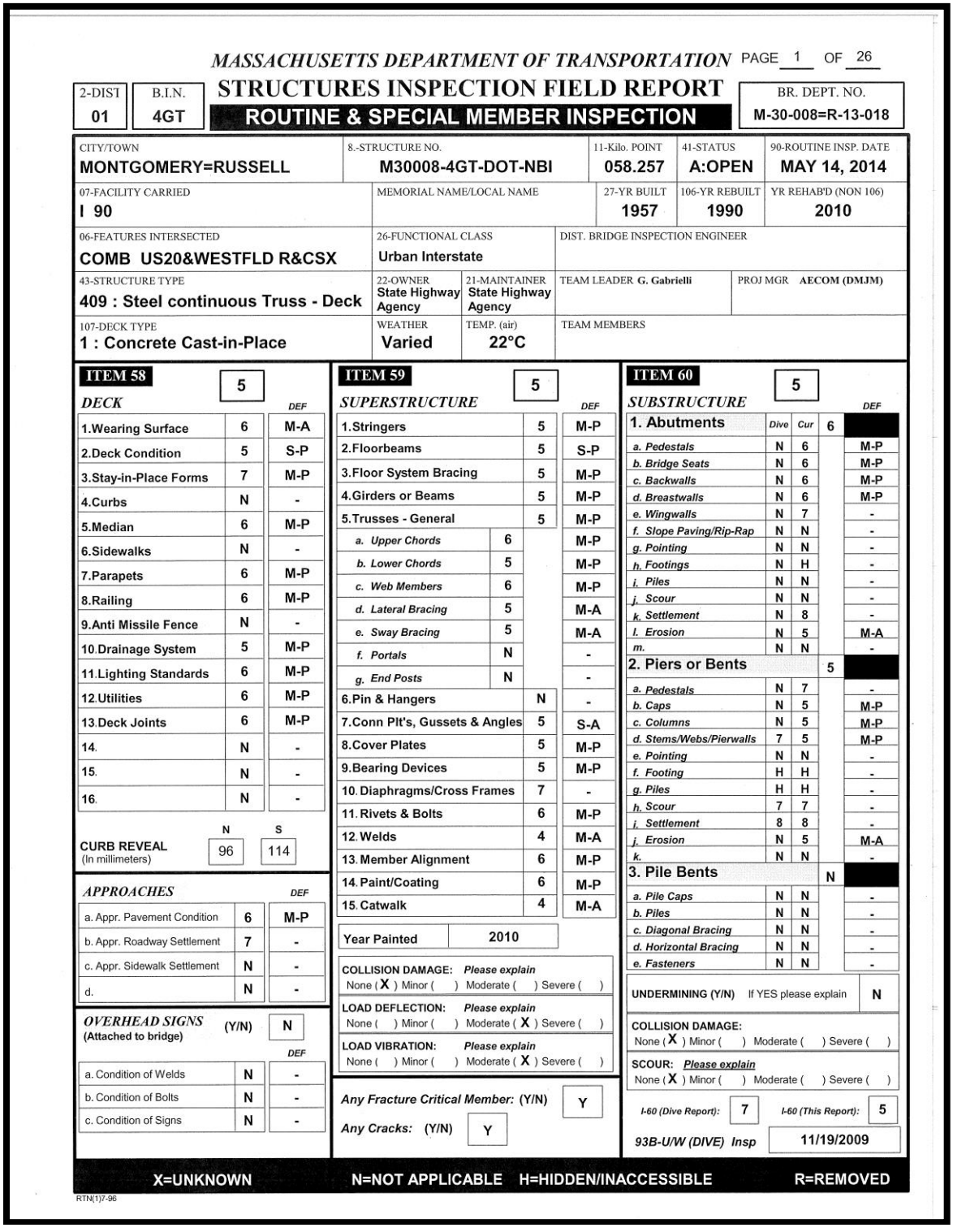
Attachment 4-6: Typical Beam End Elevation Sketch



Attachment 4-7 Typical Beam Elevation Sketch



Attachment 4-8: Typical Cross Section View of Deteriorated Prestressed Concrete Beam



MASSACHUSETTS DEPARTMENT OF TRANSPORTATION PAGE 1 OF 26

STRUCTURES INSPECTION FIELD REPORT
ROUTINE & SPECIAL MEMBER INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
01	4GT	M-30-008=R-13-018

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	41-STATUS	90-ROUTINE INSP. DATE
MONTGOMERY=RUSSELL	M30008-4GT-DOT-NBI	058.257	A:OPEN	MAY 14, 2014

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	YR REHAB'D (NON 106)
I 90		1957	1990	2010

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
COMB US20&WESTFLD R&CSX	Urban Interstate	

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER G. Gabrielli	PROJ MGR AECOM (DMJM)
409 : Steel continuous Truss - Deck	State Highway Agency	State Highway Agency		

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
1 : Concrete Cast-in-Place	Varied	22°C	

ITEM 58 — 5

DECK

		DEF
1.Wearing Surface	6	M-A
2.Deck Condition	5	S-P
3.Stay-in-Place Forms	7	M-P
4.Curbs	N	-
5.Median	6	M-P
6.Sidewalks	N	-
7.Parapets	6	M-P
8.Railing	6	M-P
9.Anti Missile Fence	N	-
10.Drainage System	5	M-P
11.Lighting Standards	6	M-P
12.Utilities	6	M-P
13.Deck Joints	6	M-P
14.	N	-
15.	N	-
16.	N	-

CURB REVEAL (In millimeters): N 96 S 114

APPROACHES

		DEF
a. Appr. Pavement Condition	6	M-P
b. Appr. Roadway Settlement	7	-
c. Appr. Sidewalk Settlement	N	-
d.	N	-

OVERHEAD SIGNS (Attached to bridge) (Y/N) N

		DEF
a. Condition of Welds	N	-
b. Condition of Bolts	N	-
c. Condition of Signs	N	-

ITEM 59 — 5

SUPERSTRUCTURE

		DEF
1.Stringers	5	M-P
2.Floorbeams	5	S-P
3.Floor System Bracing	5	M-P
4.Girders or Beams	5	M-P
5.Trusses - General	5	M-P
a. Upper Chords	6	M-P
b. Lower Chords	5	M-P
c. Web Members	6	M-P
d. Lateral Bracing	5	M-A
e. Sway Bracing	5	M-A
f. Portals	N	-
g. End Posts	N	-
6.Pin & Hangers	N	-
7.Conn Plt's, Gussets & Angles	5	S-A
8.Cover Plates	5	M-P
9.Bearing Devices	5	M-P
10.Diaphragms/Cross Frames	7	-
11.Rivets & Bolts	6	M-P
12.Welds	4	M-A
13.Member Alignment	6	M-P
14.Paint/Coating	6	M-P
15.Catwalk	4	M-A

Year Painted: 2010

COLLISION DAMAGE: *Please explain* None (X) Minor ( ) Moderate ( ) Severe ( )

LOAD DEFLECTION: *Please explain* None ( ) Minor ( ) Moderate (X) Severe ( )

LOAD VIBRATION: *Please explain* None ( ) Minor ( ) Moderate (X) Severe ( )

Any Fracture Critical Member: (Y/N) Y

Any Cracks: (Y/N) Y

ITEM 60 — 5

SUBSTRUCTURE

	Dive	Cur		DEF
1. Abutments			6	
a. Pedestals	N	6		M-P
b. Bridge Seats	N	6		M-P
c. Backwalls	N	6		M-P
d. Breastwalls	N	6		M-P
e. Wingwalls	N	7		-
f. Slope Paving/Rip-Rap	N	N		-
g. Pointing	N	N		-
h. Footings	N	H		-
i. Piles	N	N		-
j. Scour	N	N		-
k. Settlement	N	8		-
l. Erosion	N	5		M-A
m.	N	N		-
2. Piers or Bents			5	
a. Pedestals	N	7		-
b. Caps	N	5		M-P
c. Columns	N	5		M-P
d. Stems/Webs/Pierwalls	7	5		M-P
e. Pointing	N	N		-
f. Footing	H	H		-
g. Piles	H	H		-
h. Scour	7	7		-
i. Settlement	8	8		-
j. Erosion	N	5		M-A
k.	N	N		-
3. Pile Bents			N	
a. Pile Caps	N	N		-
b. Piles	N	N		-
c. Diagonal Bracing	N	N		-
d. Horizontal Bracing	N	N		-
e. Fasteners	N	N		-

UNDERMINING (Y/N) If YES please explain N

COLLISION DAMAGE: None (X) Minor ( ) Moderate ( ) Severe ( )

SCOUR: *Please explain* None (X) Minor ( ) Moderate ( ) Severe ( )

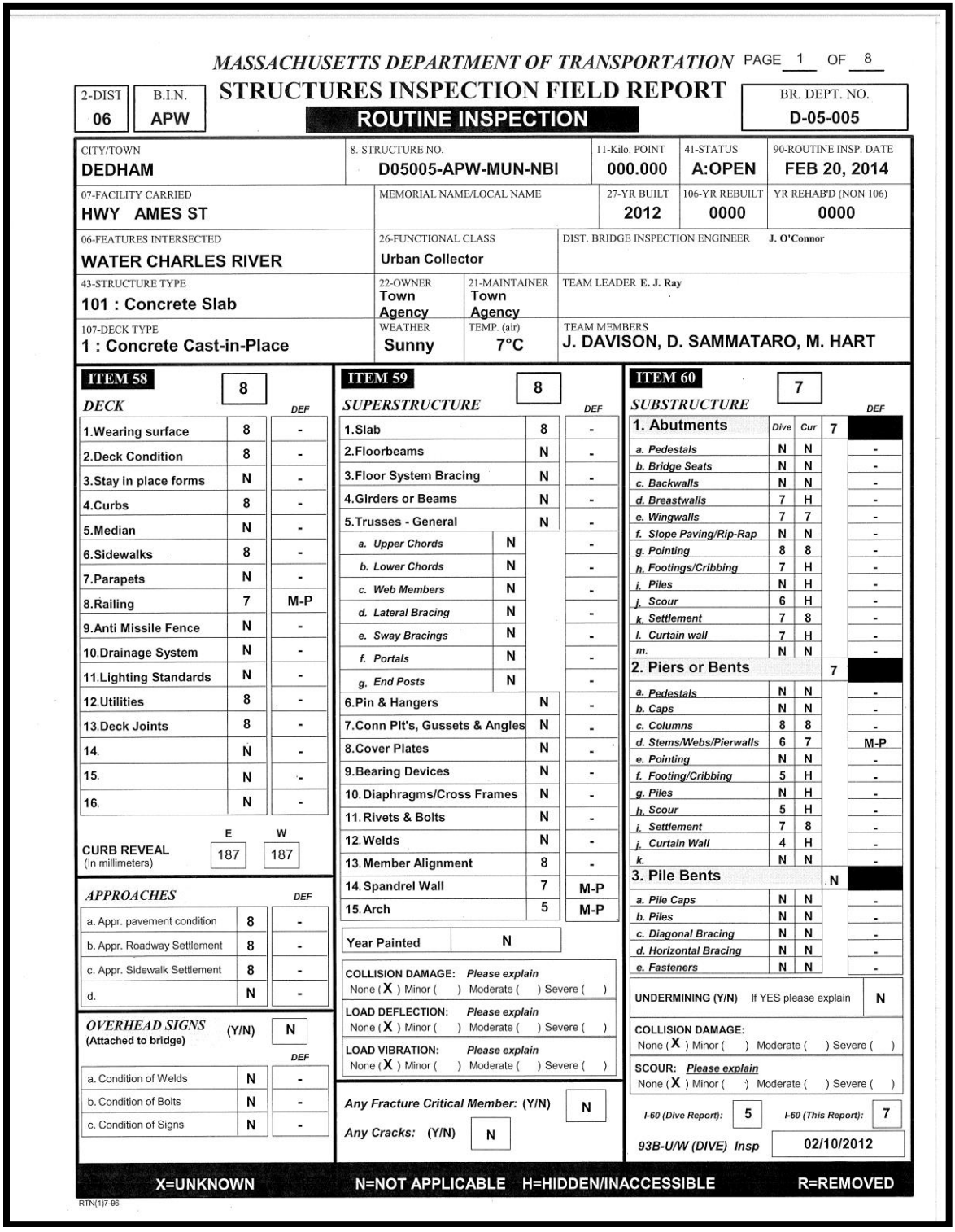
I-60 (Dive Report): 7 *I-60 (This Report):* 5

93B-U/W (DIVE) Insp 11/19/2009

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

RTN(1)7-96

Attachment 4-9: Example 1: Condition Coding of Item 60



MASSACHUSETTS DEPARTMENT OF TRANSPORTATION PAGE 1 OF 8

STRUCTURES INSPECTION FIELD REPORT

ROUTINE INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
06	APW	D-05-005

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	41-STATUS	90-ROUTINE INSP. DATE
DEDHAM	D05005-APW-MUN-NBI	000.000	A:OPEN	FEB 20, 2014

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	YR REHAB'D (NON 106)
HWY AMES ST		2012	0000	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER CHARLES RIVER	Urban Collector	J. O'Connor

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
101 : Concrete Slab	Town Agency	Town Agency	E. J. Ray

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
1 : Concrete Cast-in-Place	Sunny	7°C	J. DAVISON, D. SAMMATARO, M. HART

ITEM 58 — 8

DECK

		DEF
1.Wearing surface	8	-
2.Deck Condition	8	-
3.Stay in place forms	N	-
4.Curbs	8	-
5.Median	N	-
6.Sidewalks	8	-
7.Parapets	N	-
8.Railing	7	M-P
9.Anti Missile Fence	N	-
10.Drainage System	N	-
11.Lighting Standards	N	-
12.Utilities	8	-
13.Deck Joints	8	-
14.	N	-
15.	N	-
16.	N	-

CURB REVEAL (In millimeters)	E	W
	187	187

APPROACHES

		DEF
a. Appr. pavement condition	8	-
b. Appr. Roadway Settlement	8	-
c. Appr. Sidewalk Settlement	8	-
d.	N	-

OVERHEAD SIGNS (Attached to bridge) (Y/N) N

		DEF
a. Condition of Welds	N	-
b. Condition of Bolts	N	-
c. Condition of Signs	N	-

ITEM 59 — 8

SUPERSTRUCTURE

		DEF
1.Slab	8	-
2.Floorbeams	N	-
3.Floor System Bracing	N	-
4.Girders or Beams	N	-
5.Trusses - General	N	-
a. Upper Chords	N	-
b. Lower Chords	N	-
c. Web Members	N	-
d. Lateral Bracing	N	-
e. Sway Bracings	N	-
f. Portals	N	-
g. End Posts	N	-
6.Pin & Hangers	N	-
7.Conn Plt's, Gussets & Angles	N	-
8.Cover Plates	N	-
9.Bearing Devices	N	-
10.Diaphragms/Cross Frames	N	-
11.Rivets & Bolts	N	-
12.Welds	N	-
13.Member Alignment	8	-
14.Spandrel Wall	7	M-P
15.Arch	5	M-P

Year Painted: N

COLLISION DAMAGE: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

LOAD DEFLECTION: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

LOAD VIBRATION: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

Any Fracture Critical Member: (Y/N) N

Any Cracks: (Y/N) N

ITEM 60 — 7

SUBSTRUCTURE

	Dive	Cur		DEF
1. Abutments			7	
a. Pedestals	N	N		-
b. Bridge Seats	N	N		-
c. Backwalls	N	N		-
d. Breastwalls	7	H		-
e. Wingwalls	7	7		-
f. Slope Paving/Rip-Rap	N	N		-
g. Pointing	8	8		-
h. Footings/Cribbing	7	H		-
i. Piles	N	H		-
j. Scour	6	H		-
k. Settlement	7	8		-
l. Curtain wall	7	H		-
m.	N	N		-
2. Piers or Bents			7	
a. Pedestals	N	N		-
b. Caps	N	N		-
c. Columns	8	8		-
d. Stems/Webs/Pierwalls	6	7		M-P
e. Pointing	N	N		-
f. Footing/Cribbing	5	H		-
g. Piles	N	H		-
h. Scour	5	H		-
i. Settlement	7	8		-
j. Curtain Wall	4	H		-
k.	N	N		-
3. Pile Bents			N	
a. Pile Caps	N	N		-
b. Piles	N	N		-
c. Diagonal Bracing	N	N		-
d. Horizontal Bracing	N	N		-
e. Fasteners	N	N		-

UNDERMINING (Y/N) If YES please explain: N

COLLISION DAMAGE:
None (X) Minor ( ) Moderate ( ) Severe ( )

SCOUR: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

I-60 (Dive Report): 5 I-60 (This Report): 7

93B-U/W (DIVE) Insp: 02/10/2012

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

RTN(1)7-96

Attachment 4-10: Example 2: Condition Coding of Item 60

Example 1:

Written Narrative submitted:
Item 59.9 - Bearing Devices
Sole and masonry plates typically exhibit minor to moderate surface rust with moderate to heavy surface rust at the exterior girders (see Photos 14, 16, 17 and 18). Many of the bearing plate anchor bolts are not fully fastened. At the west abutment, the south bolt on girders 2, 5 and 6, and the north bolt on girder 3 are not fully fastened. At the pierwall, the south bolt on girder 2 is not fully fastened. At the east abutment, the north bolt on girders 2 and 5 are not fully fastened.

Preferred List or Table format :
Item 59.9 - Bearing Devices
Sole and masonry plates typically exhibit minor to moderate surface rust with moderate to heavy surface rust at the exterior girders (see Photos 14, 16, 17 and 18).

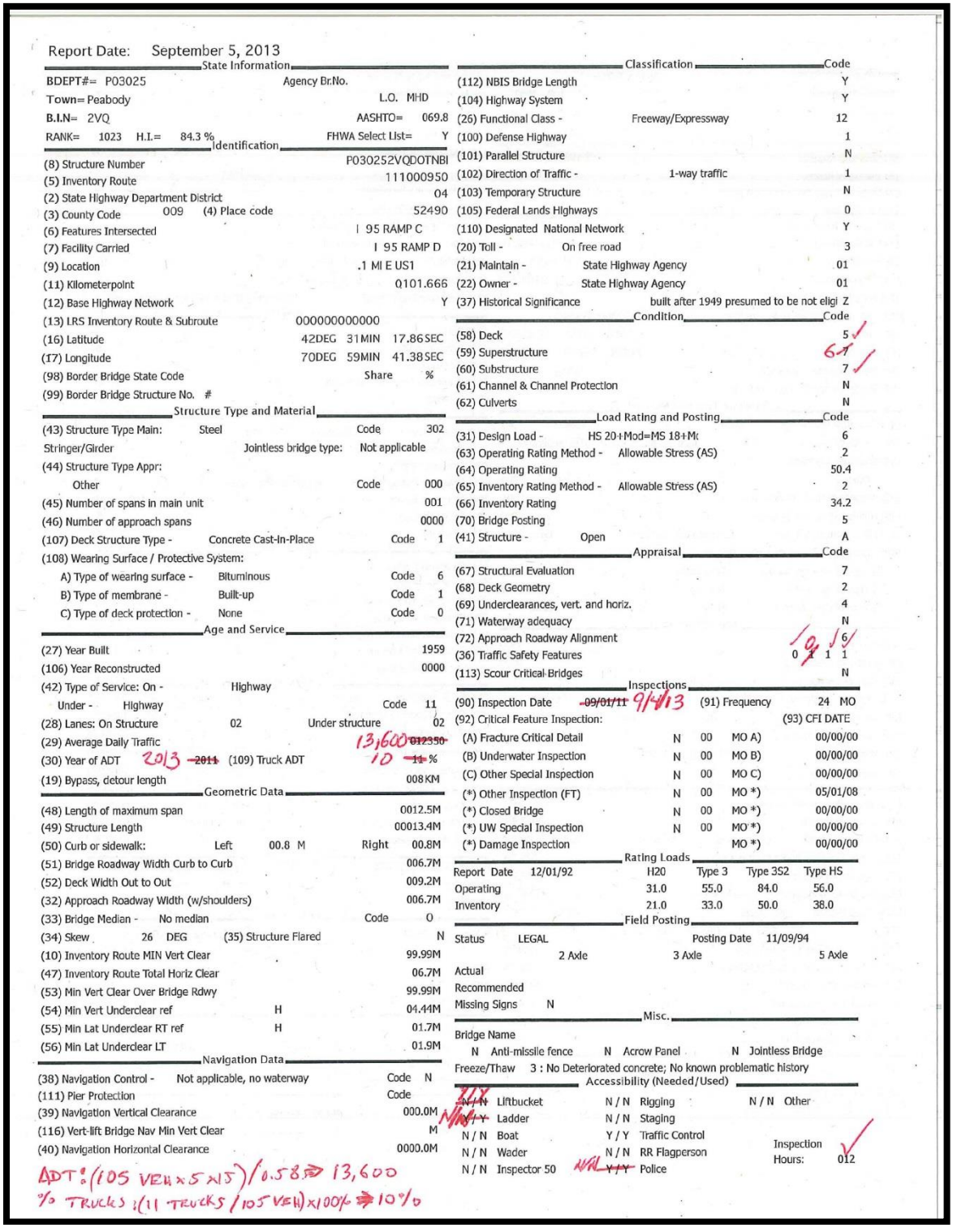
Bearing plate anchor bolts not fully fastened:
West abutment,
Girders 2, 5 & 6, the south bolt.
Girder 3, the north bolt.
Pierwall,
Girder 2, the south bolt
East abutment,
Girders 2 and 5, the north bolt.

Example 2:
Written Narrative submitted:
Item 60.1.c - Backwalls
There is a 3.5' long x 1.5' high x 3" deep spall in the west abutment backwall behind beam 1 (see Photo 21). There is a 1' long x 4" high x 4" deep spall in the west abutment backwall behind beam 4. There is hairline cracking with efflorescence and a 10" high x 4" wide x up to 2" deep spall in the west abutment behind beam 8 (see Photo 22). There is a 2.5' high x 10" wide x 2" deep spall at the east backwall behind beam 1 (see Photo 23). Both backwalls have corrosion staining from the expansion joints (see Photos 19,

Preferred List or Table format :
Item 60.1.c - Backwalls
Both backwalls have corrosion staining from the expansion joints (see Photos 19, 21, 22 and 23).

West Abutment,
Beam 1 - 3.5' long x 1.5' high x 3" deep spall (see Photo 21).
Beam 4 - 1' long x 4" high x 4" deep spall.
Beam 8 hairline cracking with efflorescence and a 10" high x 4" wide x up to 2" deep spall (see Photo 22).
East Abutment,
Beam 1 - 2.5' high x 10" wide x 2" deep spall (see Photo 23).

Attachment 4-11: Example of presenting information in an Inspection Report



Report Date: September 5, 2013

State Information

BDEPT#= P03025 Agency Br.No.
Town= Peabody L.O. MHD
B.I.N= 2VQ AASHTO= 069.8
RANK= 1023 H.I.= 84.3 % FHWA Select List= Y

Identification

(8) Structure Number	P030252VQDOTNBI
(5) Inventory Route	111000950
(2) State Highway Department District	04
(3) County Code 009 (4) Place code	52490
(6) Features Intersected	I 95 RAMP C
(7) Facility Carried	I 95 RAMP D
(9) Location	.1 MI E US1
(11) Kilometerpoint	0101.666
(12) Base Highway Network	Y
(13) LRS Inventory Route & Subroute	000000000000
(16) Latitude	42DEG 31MIN 17.86SEC
(17) Longitude	70DEG 59MIN 41.38SEC
(98) Border Bridge State Code	Share %
(99) Border Bridge Structure No. #	

Structure Type and Material

(43) Structure Type Main: Steel	Code	302
Stringer/Girder	Jointless bridge type:	Not applicable
(44) Structure Type Appr: Other	Code	000
(45) Number of spans in main unit		001
(46) Number of approach spans		0000
(107) Deck Structure Type - Concrete Cast-In-Place	Code	1
(108) Wearing Surface / Protective System:		
A) Type of wearing surface - Bituminous	Code	6
B) Type of membrane - Built-up	Code	1
C) Type of deck protection - None	Code	0

Age and Service

(27) Year Built		1959
(106) Year Reconstructed		0000
(42) Type of Service: On - Highway		
Under - Highway	Code	11
(28) Lanes: On Structure 02	Under structure	02
(29) Average Daily Traffic		13,600 ~~012350~~
(30) Year of ADT 2013 ~~2011~~ (109) Truck ADT		10 ~~11~~ %
(19) Bypass, detour length		008 KM

Geometric Data

(48) Length of maximum span				0012.5M
(49) Structure Length				00013.4M
(50) Curb or sidewalk:	Left	00.8 M	Right	00.8M
(51) Bridge Roadway Width Curb to Curb				006.7M
(52) Deck Width Out to Out				009.2M
(32) Approach Roadway Width (w/shoulders)				006.7M
(33) Bridge Median - No median			Code	0
(34) Skew 26 DEG (35) Structure Flared				N
(10) Inventory Route MIN Vert Clear				99.99M
(47) Inventory Route Total Horiz Clear				06.7M
(53) Min Vert Clear Over Bridge Rdwy				99.99M
(54) Min Vert Underclear ref	H			04.44M
(55) Min Lat Underclear RT ref	H			01.7M
(56) Min Lat Underclear LT				01.9M

Navigation Data

(38) Navigation Control - Not applicable, no waterway	Code	N
(111) Pier Protection	Code	
(39) Navigation Vertical Clearance		000.0M
(116) Vert-lift Bridge Nav Min Vert Clear		M
(40) Navigation Horizontal Clearance		0000.0M

ADT = (105 VEH x 5 NJ) / 0.58 ⇒ 13,600
% TRUCKS = (11 TRUCKS / 105 VEH) x 100% ⇒ 10%

Classification

		Code
(112) NBIS Bridge Length		Y
(104) Highway System		Y
(26) Functional Class -	Freeway/Expressway	12
(100) Defense Highway		1
(101) Parallel Structure		N
(102) Direction of Traffic -	1-way traffic	1
(103) Temporary Structure		N
(105) Federal Lands Highways		0
(110) Designated National Network		Y
(20) Toll -	On free road	3
(21) Maintain -	State Highway Agency	01
(22) Owner -	State Highway Agency	01
(37) Historical Significance	built after 1949 presumed to be not eligi	Z

Condition

	Code
(58) Deck	5
(59) Superstructure	~~6~~ 7
(60) Substructure	7
(61) Channel & Channel Protection	N
(62) Culverts	N

Load Rating and Posting

	Code
(31) Design Load - HS 20+Mod=MS 18+M	6
(63) Operating Rating Method - Allowable Stress (AS)	2
(64) Operating Rating	50.4
(65) Inventory Rating Method - Allowable Stress (AS)	2
(66) Inventory Rating	34.2
(70) Bridge Posting	5
(41) Structure - Open	A

Appraisal

	Code
(67) Structural Evaluation	7
(68) Deck Geometry	2
(69) Underclearances, vert. and horiz.	4
(71) Waterway adequacy	N
(72) Approach Roadway Alignment	~~0~~ 6
(36) Traffic Safety Features	0 ~~1~~ 1 1
(113) Scour Critical Bridges	N

Inspections

(90) Inspection Date ~~09/01/11~~ 9/4/13 (91) Frequency 24 MO

(92) Critical Feature Inspection: (93) CFI DATE

(A) Fracture Critical Detail	N	00	MO A)	00/00/00
(B) Underwater Inspection	N	00	MO B)	00/00/00
(C) Other Special Inspection	N	00	MO C)	00/00/00
(*) Other Inspection (FT)	N	00	MO *)	05/01/08
(*) Closed Bridge	N	00	MO *)	00/00/00
(*) UW Special Inspection	N	00	MO *)	00/00/00
(*) Damage Inspection			MO *)	00/00/00

Rating Loads

Report Date 12/01/92	H20	Type 3	Type 3S2	Type HS
Operating	31.0	55.0	84.0	56.0
Inventory	21.0	33.0	50.0	38.0

Field Posting

Status LEGAL Posting Date 11/09/94

	2 Axle	3 Axle	5 Axle
Actual			
Recommended			

Missing Signs N

Misc.

Bridge Name

N Anti-missile fence N Acrow Panel N Jointless Bridge
Freeze/Thaw 3 : No Deteriorated concrete; No known problematic history

Accessibility (Needed/Used)

~~N/N~~ Liftbucket	N / N	Rigging	N / N	Other	
~~N/N~~ Ladder	N / N	Staging			
N / N Boat	Y / Y	Traffic Control			
N / N Wader	N / N	RR Flagperson	Inspection Hours:	012	
N / N Inspector 50	~~N/N~~ Y / Y	Police			

Attachment 4-12: Marked up copy of SI&A sheet

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION

CRITICAL DEFICIENCY ACTIVITY LOG

DEFICIENCY TYPE: ( ) **STRUCTURAL** ( ) **HAZARD**

City/Town: **Bridge No.:** **BIN No:**

Location:

Team Leader: **Date Reported:** **Time Reported:**

Critical – Deficiency:

Name, Date & Time of oral report to:

District Representative:

Municipality or Custodian:

Boston Bridge Section:

Action Taken/Comments:

Special Follow-Up Inspection:

Needed? Y/N ( )

Estimate Date:

District Bridge Inspection Engineer: **Date:**

CRITICAL DEFICIENCY VERIFICATION

Return to: *(The DBIE's name)*
(Address)

PLEASE SIGN AND RETURN THIS FORM, NOTING ANY CORRECTION ACTION AND ATTACH DOCUMENTATION REGARDING THE FOLLOWING":

( ) **Immediate Corrective action taken on:**

( ) **Future additional corrective action to be taken by:**

Action Taken/Comments:

Signed: **Date:**

cc: Bridge Inspection Engineer

Attachment 4-13: Critical Deficiency Activity Log/Critical Deficiency Verification Form

April 30, 2012

City/Town
Address

Attn*: Highway Superintendent*

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE CLOSURE
New Marlborough: NORFOLK RD / UMPACHENE BROOK
Bridge No: N-08-001
BIN No: 067
Structure No: N08001-067-MUN-NBI

Dear Mr./Mrs :

Attached, is the MassDOT Critical Deficiency Log, please indicate the action taken on the deficiency noted, and return the form to the Department. On *DATE, City/Town official* was notified of the deficiency and the Department expects that the action taken by the *City/Town* would be immediate.

As part of the Massachusetts Bridge Inspection Program Policy we notify the Massachusetts Division of Federal Highway Administration of all Critical Hazard or Critical Structural deficiencies found Statewide.

Repair, rehabilitation or reconstruction of any bridges to address these deficiencies reported are the owner /custodian's responsibility. Chapter 90 funds may be used for these purposes.

Questions regarding this issue may be directed to the District Bridge Inspection Engineer, at

The Department is pleased to assist you in this matter of bridge safety.

Sincerely,

District Highway Director.

cc: DHD, A. Bardow, File

Attachment 4-14: Critical Deficiency Log/Verification Letter to Municipalities

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
INTEROFFICE MEMORANDUM

TO: District Highway Director

ATTN: District Bridge Engineer

FROM: Alexander K. Bardow, P.E., State Bridge Engineer

DATE:

RE: **CRITICAL –STRUCTURAL DEFICIENCY**

Town Name: Facility Carried / Facility Intersected
Bridge No:
BIN No:
Structure No:

We are informing you that no action has been taken since we reported this Critical Structural deficiency for the subject structure. Please be advised that a Critical-Structural Deficiency is a deficiency to a structural element of a bridge that poses an extreme unsafe condition, due to the failure or imminent failure of the element which will affect the structural integrity of the bridge. Critical- Structural deficiencies require immediate corrective action.

Please inform this Office with regards to the corrective action that has taken place as soon as possible. Also, please return the Critical –Structural Deficiency Activity Log/Verification Form attached with action taken.

If you have any question with regards to this issue please contact the Brian Clang, Bridge Inspection Engineer at 857-368-9425.

cc: DBIE D#, BBC

Enclosure: Critical –Structural Deficiency Activity Log/Verification Form

Attachment 4-15: Follow Up Critical Structural Deficiency Memo for State Owned Bridges

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
INTEROFFICE MEMORANDUM

TO: District Highway Director

ATTN: District Bridge Engineer

FROM: Alexander K. Bardow, P.E., State Bridge Engineer

DATE:

RE: **CRITICAL –HAZARD DEFICIENCY**

Town Name: Facility Carried / Facility Intersected
Bridge No:
BIN No:
Structure No:

We are informing you that no action has been taken since we reported this Critical Hazard deficiency for the subject structure. Please be advised that a Critical-Hazard Deficiency is a deficiency in a component or element that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Critical- Hazard deficiencies require immediate corrective action.

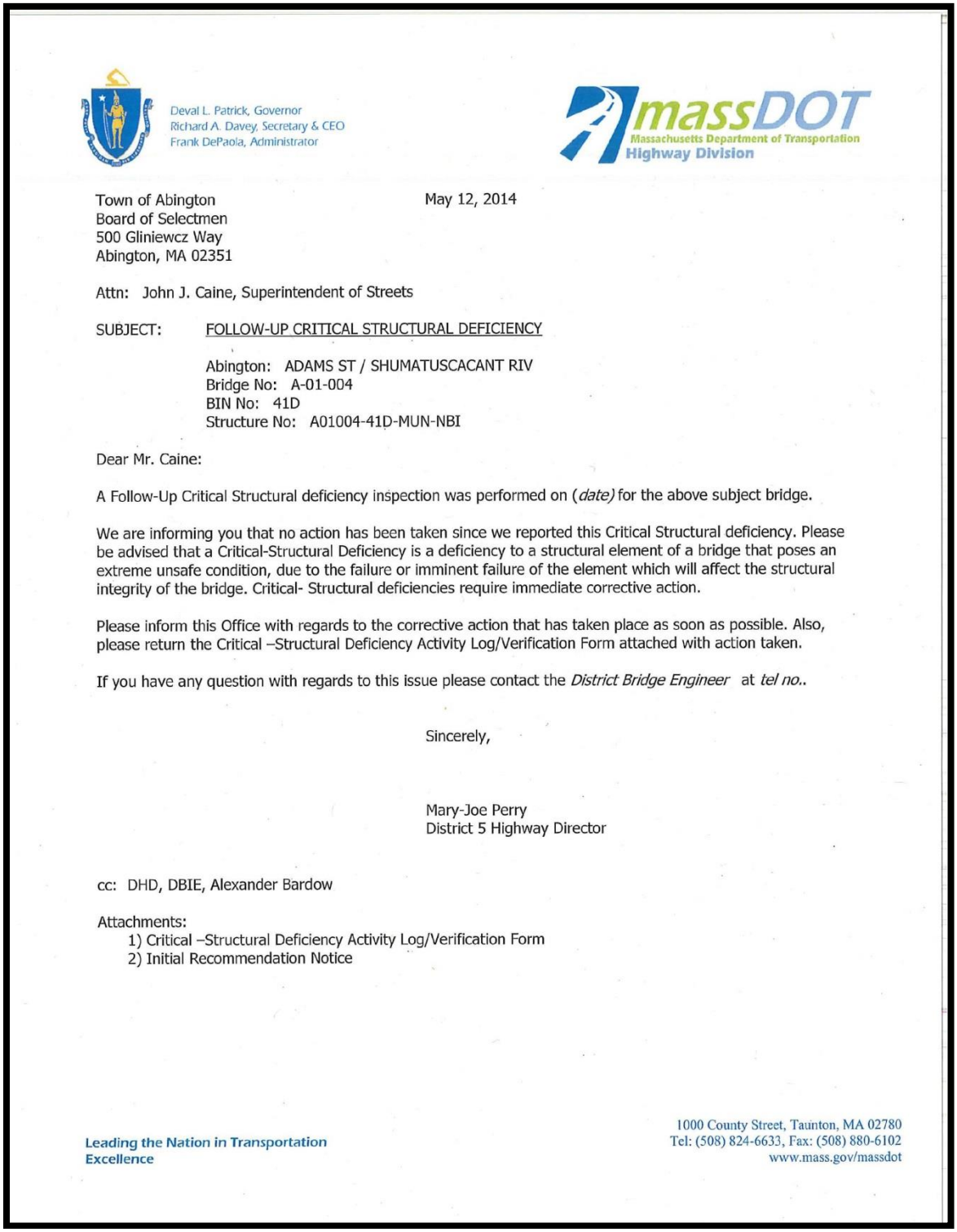
Please inform this Office with regards to the corrective action that has taken place as soon as possible. Also, please return the Critical –Hazard Deficiency Activity Log/Verification Form attached with action taken.

If you have any question with regards to this issue please contact the Brian Clang, Bridge Inspection Engineer at 857-368-9425.

cc: DBIE D#, BBC

Enclosure: Critical –Hazard Deficiency Activity Log/Verification Form

Attachment 4-16: Follow Up Critical Hazard Deficiency Notification Memo for State Owned Bridges



Deval L. Patrick, Governor
Richard A. Davey, Secretary & CEO
Frank DePaola, Administrator

massDOT
Massachusetts Department of Transportation
Highway Division

Town of Abington
Board of Selectmen
500 Gliniewcz Way
Abington, MA 02351

May 12, 2014

Attn: John J. Caine, Superintendent of Streets

SUBJECT: FOLLOW-UP CRITICAL STRUCTURAL DEFICIENCY

Abington: ADAMS ST / SHUMATUSCACANT RIV
Bridge No: A-01-004
BIN No: 41D
Structure No: A01004-41D-MUN-NBI

Dear Mr. Caine:

A Follow-Up Critical Structural deficiency inspection was performed on (*date)* for the above subject bridge.

We are informing you that no action has been taken since we reported this Critical Structural deficiency. Please be advised that a Critical-Structural Deficiency is a deficiency to a structural element of a bridge that poses an extreme unsafe condition, due to the failure or imminent failure of the element which will affect the structural integrity of the bridge. Critical- Structural deficiencies require immediate corrective action.

Please inform this Office with regards to the corrective action that has taken place as soon as possible. Also, please return the Critical –Structural Deficiency Activity Log/Verification Form attached with action taken.

If you have any question with regards to this issue please contact the *District Bridge Engineer* at *tel no.*.

Sincerely,

Mary-Joe Perry
District 5 Highway Director

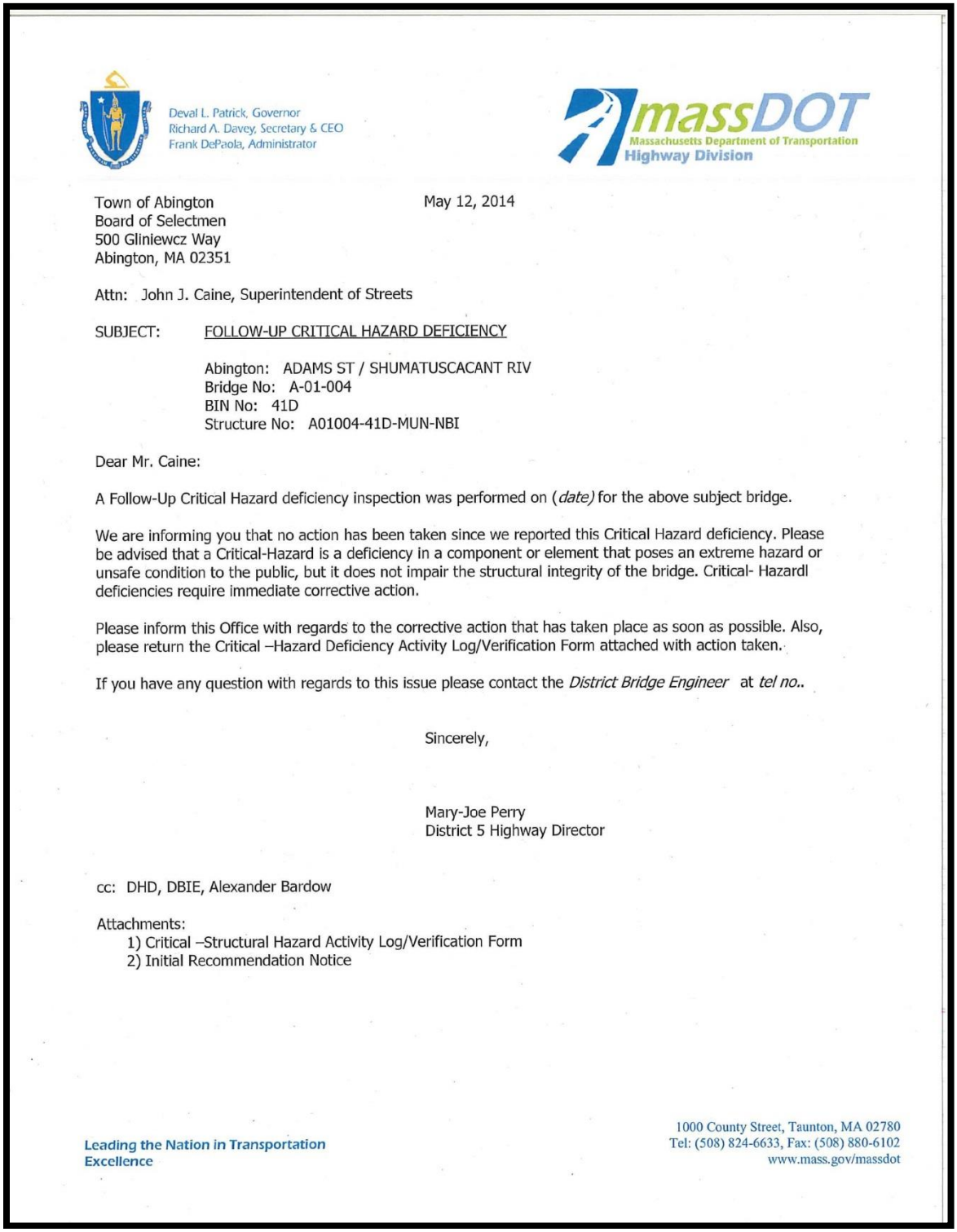
cc: DHD, DBIE, Alexander Bardow

Attachments:
1) Critical –Structural Deficiency Activity Log/Verification Form
2) Initial Recommendation Notice

Leading the Nation in Transportation Excellence

1000 County Street, Taunton, MA 02780
Tel: (508) 824-6633, Fax: (508) 880-6102
www.mass.gov/massdot

Attachment 4-17: Follow Up Critical Structural Deficiency Notification Letter to City/Town



Deval L. Patrick, Governor
Richard A. Davey, Secretary & CEO
Frank DePaola, Administrator

massDOT
Massachusetts Department of Transportation
Highway Division

Town of Abington
Board of Selectmen
500 Gliniewcz Way
Abington, MA 02351

May 12, 2014

Attn: John J. Caine, Superintendent of Streets

SUBJECT: FOLLOW-UP CRITICAL HAZARD DEFICIENCY

Abington: ADAMS ST / SHUMATUSCACANT RIV
Bridge No: A-01-004
BIN No: 41D
Structure No: A01004-41D-MUN-NBI

Dear Mr. Caine:

A Follow-Up Critical Hazard deficiency inspection was performed on (*date)* for the above subject bridge.

We are informing you that no action has been taken since we reported this Critical Hazard deficiency. Please be advised that a Critical-Hazard is a deficiency in a component or element that poses an extreme hazard or unsafe condition to the public, but it does not impair the structural integrity of the bridge. Critical- Hazardl deficiencies require immediate corrective action.

Please inform this Office with regards to the corrective action that has taken place as soon as possible. Also, please return the Critical –Hazard Deficiency Activity Log/Verification Form attached with action taken.

If you have any question with regards to this issue please contact the *District Bridge Engineer* at *tel no.*.

Sincerely,

Mary-Joe Perry
District 5 Highway Director

cc: DHD, DBIE, Alexander Bardow

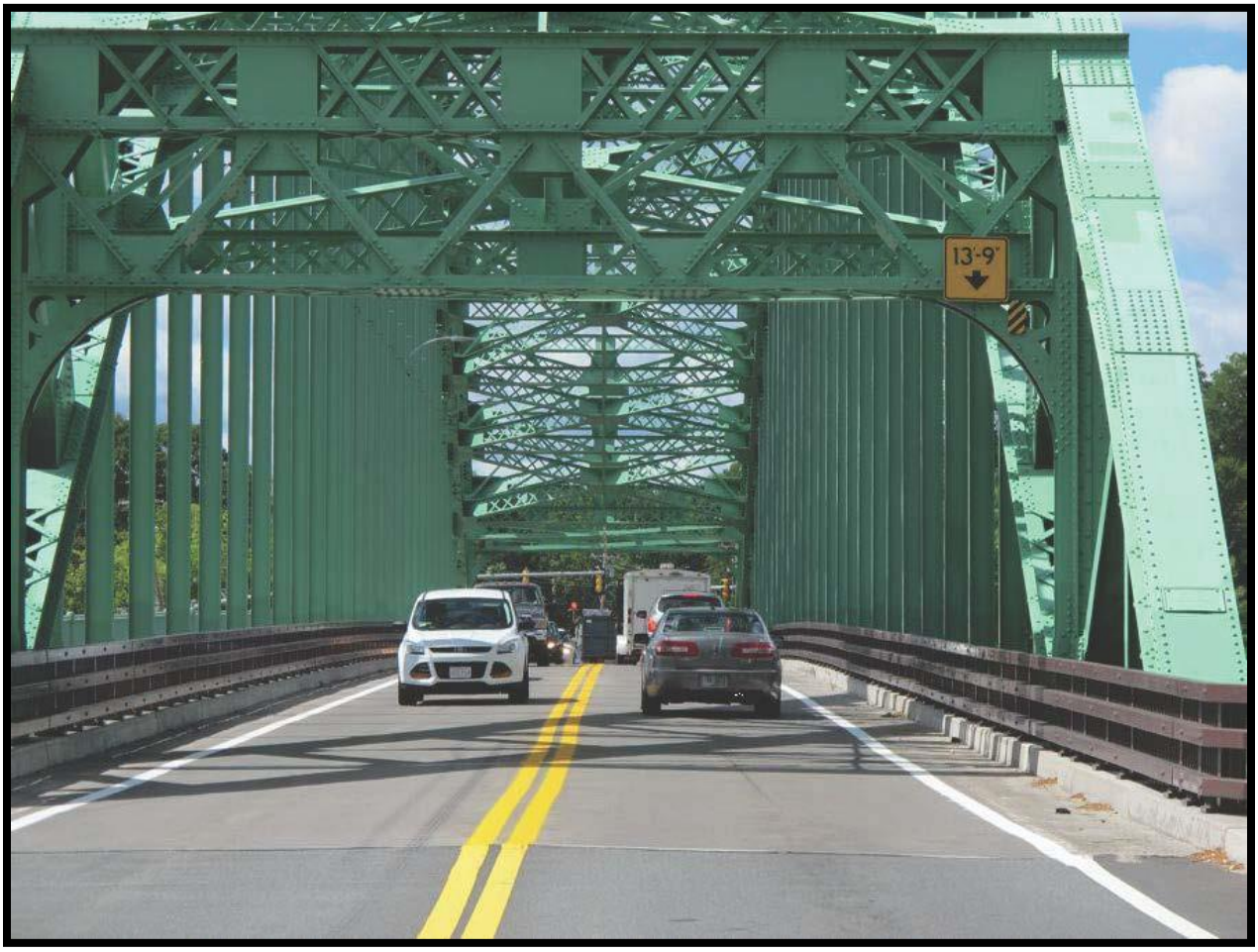
Attachments:
1) Critical –Structural Hazard Activity Log/Verification Form
2) Initial Recommendation Notice

Leading the Nation in Transportation Excellence

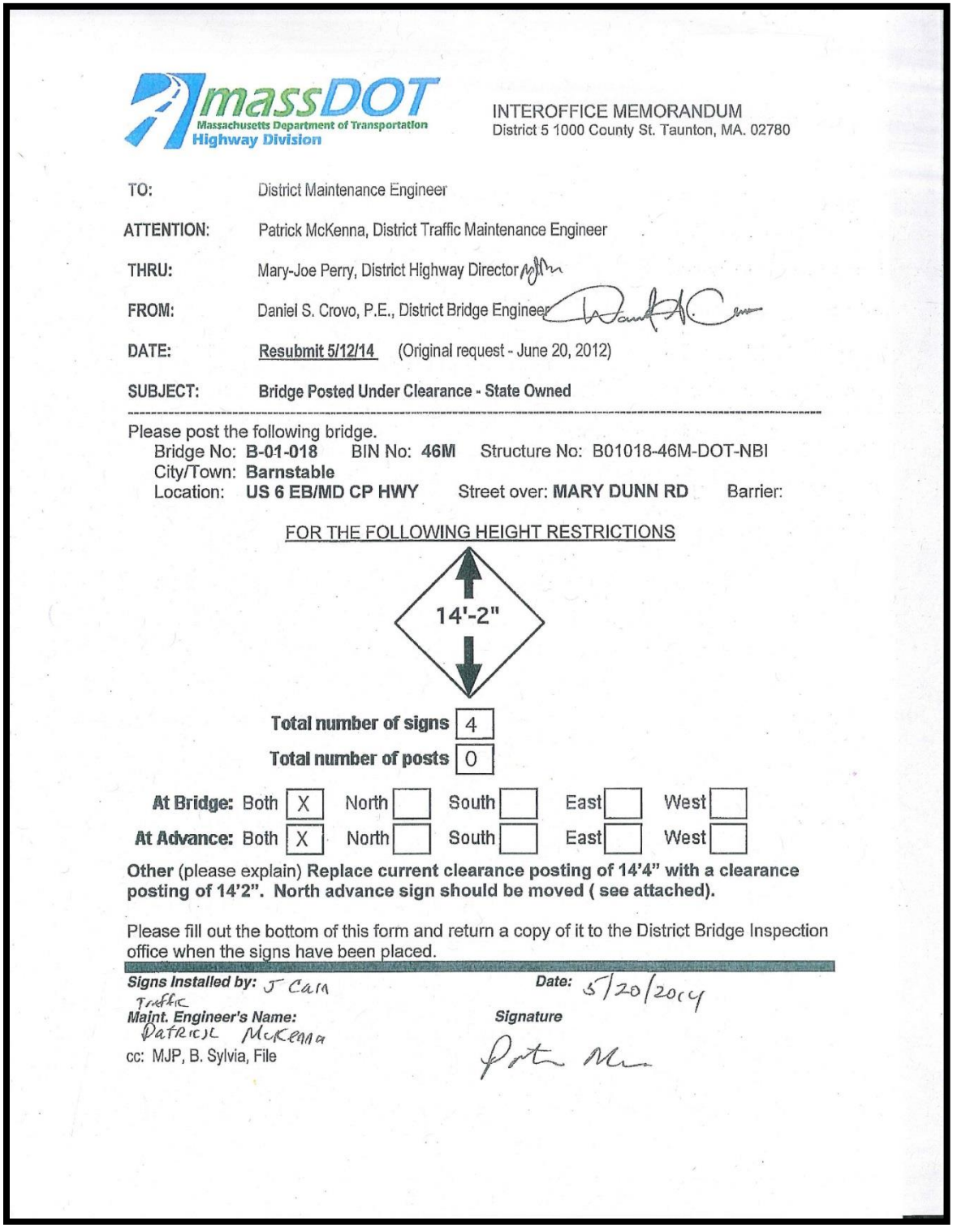
1000 County Street, Taunton, MA 02780
Tel: (508) 824-6633, Fax: (508) 880-6102
www.mass.gov/massdot

Attachment 4-18: Follow Up Critical Hazard Deficiency Notification Letter to City/Town

Attachment 4-19: Example of Vertical Clearance Posting for Rigid Frame Structure



Attachment 4-20: Example of Vertical Clearance Posting for Truss Portal Structure



massDOT
Massachusetts Department of Transportation
Highway Division

INTEROFFICE MEMORANDUM
District 5 1000 County St. Taunton, MA. 02780

TO: District Maintenance Engineer

ATTENTION: Patrick McKenna, District Traffic Maintenance Engineer

THRU: Mary-Joe Perry, District Highway Director

FROM: Daniel S. Crovo, P.E., District Bridge Engineer

DATE: Resubmit 5/12/14 (Original request - June 20, 2012)

SUBJECT: Bridge Posted Under Clearance - State Owned

Please post the following bridge.
Bridge No: **B-01-018** BIN No: **46M** Structure No: B01018-46M-DOT-NBI
City/Town: **Barnstable**
Location: **US 6 EB/MD CP HWY** Street over: **MARY DUNN RD** Barrier:

FOR THE FOLLOWING HEIGHT RESTRICTIONS

Total number of signs 4
Total number of posts 0

At Bridge:	Both	X	North		South		East		West	
At Advance:	Both	X	North		South		East		West	

Other (please explain) **Replace current clearance posting of 14'4" with a clearance posting of 14'2". North advance sign should be moved (see attached).**

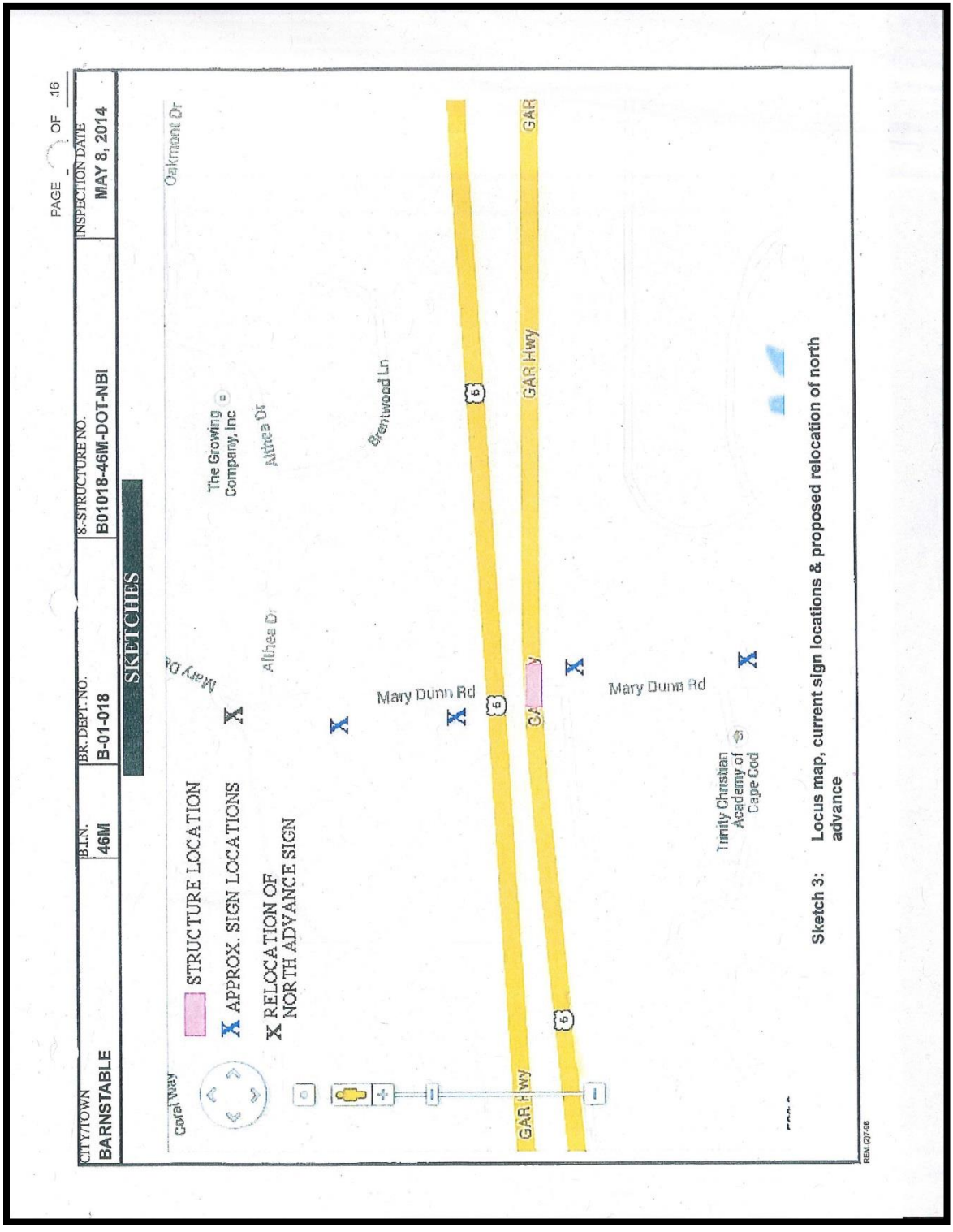
Please fill out the bottom of this form and return a copy of it to the District Bridge Inspection office when the signs have been placed.

Signs Installed by: J Carr Traffic **Date:** 5/20/2014

Maint. Engineer's Name: Patrick McKenna **Signature**

cc: MJP, B. Sylvia, File

Attachment 4-21: Letter for Missing Vertical Clearance Posting, State Owned Structure, Page 1 of 2



Attachment 4-21: Letter for Missing Vertical Clearance Posting, State Owned Structure, Page 2 of 2

Deval L. Patrick, Governor
Richard A. Davey, Secretary & CEO
Frank DePaola, Administrator

massDOT Massachusetts Department of Transportation Highway Division

City of Springfield
70 Tapley Street
Springfield, MA 01104

November 11, 2014

Attn: Christopher M Cignoli, P.E., Director of Public Works

Subject: **MISSING CLEARANCE POSTING SIGNS**

Dear Members of the Board:

Based upon the Bridge Inspection done on 05/07/2013, (copy filed with the District Bridge Inspection Unit) the following bridge was found to have missing posting signs. Please post the following bridge.

Bridge No: S-24-032 **Structure No:** S24032-0N7-MUN-NBI **BIN No:** 0N7
City/Town: Springfield
Location: STATE ST **Street Over:** ROOSEVELT AVE **Barrier:**

FOR THE FOLLOWING HEIGHT RESTRICTIONS

Total number of signs 2
Total number of posts 0

At Bridge:	Both	X	North		South		East		West	
At Advance:	Both		North		South		East		West	

Other (Please explain) **This is field measured clearance.**

Be advised that the missing Posting signs should be installed within 30 days of this notice. Please fill out the bottom of this form and return a copy of it to the District Bridge Inspection Office where the signs have been placed.

Sincerely,

Albert Stegemann, P.E.
District Highway Director

BJS/bjs
cc: BIE (3), DHD, D-2 & DBIE, D-2

Signs Installed by: ***Date:***
Municipality Official's Name: ***Signature***

Leading the Nation in Transportation Excellence

811 North King Street, Northampton, MA 01060
Tel: (413) 582-0599, Fax: (413) 582-0596
www.mass.gov/massdot

Attachment 4-22: Letter for Missing Vertical Clearance Posting, Municipally Owned Structure

BRIDGE INSPECTION CONSULTANT PERFORMANCE EVALUATION REPORT

MassDOT Highway Division- Bridge Section

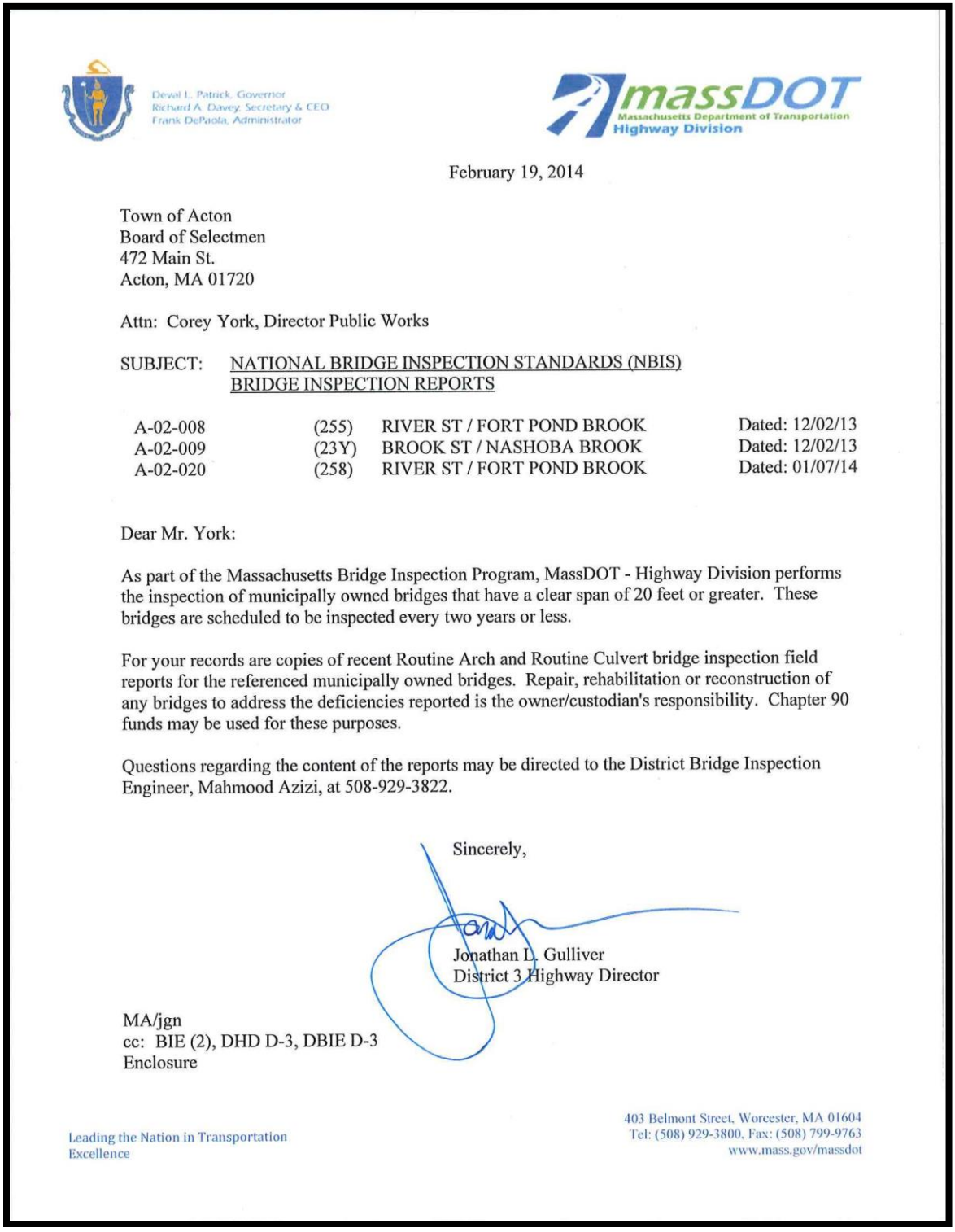
Consultant's Name	Contract No.	Assignment No.
MASSDOT Evaluator's Name	MASSDOT Evaluator's Signature	Consultant Overall Score (1-10)
Bridge & BIN No(s).	Location(s)	

In order to comply with Engineering Directive E-98-001 Consultant Performance Evaluation, the Inspection reports that are prepared by Consultants will require that the District Bridge Inspection Engineer provide a score for each of the Inspection reports received and processed.

CONSULTANT PERFORMANCE EVALUATION INSPECTION SUB ELEMENTS	
Sub Element Grading Items	Score (1-10)
Inspection Frequency – Did the Consultant complete the field inspection in the month that the inspection was due in accordance with NBIS and were all required elements inspected?	
Field Activities– Did the Consultant complete a Roadway Work Notification Form if required with the appropriate lead time? Did the Consultant inform the DBIE of the field inspection in advance?	
Critical Deficiency Notification – If a Critical Deficiency was identified during the inspection, did the Consultant immediately inform the DBIE of the situation?	
Electronic Submission – Was the first electronic submission of the inspection report completed within an acceptable time frame?	
Inspection Report Quality – Were an excessive number of review comments and corrections required in order to produce an acceptable Inspection Report?	
Consultant Responsiveness – Was the final approved inspection report submitted in a timely manner and was the Consultant responsive and cooperative throughout the assignment?	

CONSULTANT PERFORMANCE EVALUATION RATING SCALE GUIDE
Exceptional Performance (9 & 10) – Consultant consistently exceeded expectations. The submitted inspection report consistently exceeds requirements in all phases of the work. This level should be reserved for only special occasions where the Consultant always exceeds expectations.
Above Average Performance (7 & 8) – Consultant frequently exceeded expectations. Performance is above average. Consultant requires a minimal amount of monitoring. Agency coordination and public involvement activities are always timely and well done. Consultant reacts well to criticism.
Average Performance (4, 5 & 6) – Consultant consistently met expectations. Meets quality/performance expectations. Assignment is completed on time. There may be some areas that need minor improvements but the tasks are usually done on time and with minor revisions. Good inspection practices/management.
Below Average Performance (2 & 3) – Consultant frequently failed to meet expectations. Some work or time requirements need improvement but with monitoring are acceptable. Consultant's work is done solely by rote. Consultant should have a plan for improvement if they expect to be selected for additional projects.
Unacceptable Performance (0 & 1) – Consultant consistently failed to meet expectations. The consultant's work has numerous errors/omissions and the consultant requires a high degree of monitoring to complete the work. Significant improvements need to be made before consideration for future work.

Attachment 4-23: Bridge Inspection Consultant Performance Evaluation Report



Deval L. Patrick, Governor
Richard A. Davey, Secretary & CEO
Frank DePaola, Administrator

MassDOT Massachusetts Department of Transportation Highway Division

February 19, 2014

Town of Acton
Board of Selectmen
472 Main St.
Acton, MA 01720

Attn: Corey York, Director Public Works

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE INSPECTION REPORTS

A-02-008	(255)	RIVER ST / FORT POND BROOK	Dated: 12/02/13
A-02-009	(23Y)	BROOK ST / NASHOBA BROOK	Dated: 12/02/13
A-02-020	(258)	RIVER ST / FORT POND BROOK	Dated: 01/07/14

Dear Mr. York:

As part of the Massachusetts Bridge Inspection Program, MassDOT - Highway Division performs the inspection of municipally owned bridges that have a clear span of 20 feet or greater. These bridges are scheduled to be inspected every two years or less.

For your records are copies of recent Routine Arch and Routine Culvert bridge inspection field reports for the referenced municipally owned bridges. Repair, rehabilitation or reconstruction of any bridges to address the deficiencies reported is the owner/custodian's responsibility. Chapter 90 funds may be used for these purposes.

Questions regarding the content of the reports may be directed to the District Bridge Inspection Engineer, Mahmood Azizi, at 508-929-3822.

Sincerely,

Jonathan L. Gulliver
District 3 Highway Director

MA/jgn
cc: BIE (2), DHD D-3, DBIE D-3
Enclosure

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403 Belmont Street, Worcester, MA 01604
Tel: (508) 929-3800, Fax: (508) 799-9763
www.mass.gov/massdot

Attachment 4-24: Cover Letter from DHD to Municipality transmitting Inspection Report

CHAPTER 5
QUALITY CONTROL AND QUALITY ASSURANCE

5.1 QUALITY CONTROL and QUALITY ASSURANCE

Quality Control and Quality Assurance are integrated into all aspects of bridge inspection. They contain the essential requirements to demonstrate that care, skill and diligence is used in the preparation of bridge inspection reports.

The Bridge Inspection Unit will put in place those management tools needed to define, implement, and evaluate the effectiveness of the Unit, to provide feedback for performance enhancement and institute actions to prevent recurrence. Together these activities ensure that:

- Personnel have the appropriate tools and information available to perform the work
- Personnel have clearly defined programs, processes, and procedures as a basis to perform their work
- Personnel are sufficiently trained to assure good work performance
- Appropriate management oversight is provided for work performance to identify and correct problems if they exist

Quality Control is the checks necessary to maintain a uniform level of quality. For the purposes of this Chapter, the District Bridge Inspection Engineer (DBIE) is the Quality Control Engineer who performs these checks.

Quality Assurance is an independent evaluation of a service (i.e., an inspection) to establish that a pre-described level of quality has been met. For the purposes of this Chapter, the Area Bridge Inspection Engineers (ABIE) and the Underwater Operations Engineer are the Quality Assurance Engineers who perform these evaluations. The Quality Assurance Supervisor is the Bridge Inspection Engineer (BIE).

The review for the Quality Control and Quality Assurance program shall include the Bridge Inspection Engineer, the Area Bridge Inspection Engineer, Underwater Operations Engineer and the District Bridge Inspection Engineer.

Note: At the discretion of the Bridge Inspection Engineer others within the MassDOT staff and/or Consultants may be designated to assist in reviewing material.

5.2 QUALITY CONTROL ENGINEER

The Quality Control Engineer's responsibilities include but are not limited to the review of the inspection reports, review of the inspection methods by the teams in field and the review of structures that are classified as structurally deficient (SD) by the Team Leaders.

5.2.1 Inspection Report Evaluations

The Quality Control Engineer and his/her assistant shall collectively review 100% of all inspection reports. The DBIE or ADBIE will sign all inspection reports reviewed by him/her. This review will be

performed on inspection reports prepared by MassDOT staff and/or Consultants. The DBIE is not responsible for the review of inspection reports prepared for other agencies, i.e.; MassPort, MBTA.

The Quality Control Engineer will be personally responsible for the review of all inspection reports that have an assigned numerical ratings of 5 or below for Item 58, Item 59, Item 60, or Item 62. The Assistant District Bridge Inspection Engineer may be responsible for the review of all inspection reports that have assigned numerical ratings of 6 or greater for Item 58, Item 59, Item 60, or Item 62 if the DBIE chooses to delegate that task to the ADBIE.

The Quality Control Engineer's review will consist of the following:

1. Overall review of the Inspection Report to ensure that the correct form has been used, that the correct bridge is identified and that all required information has been entered.

2. Review that all information has been correctly entered in accordance with the FHWA Coding Guide and the MassDOT Bridge Inspection Handbook criteria. This review will include but not be limited to a check that proper coding conventions, format, significant digits and correct units have been used.

3. Check that the Condition Ratings for Items 58 through 62 are consistent with the condition ratings of the individual sub-items.

4. Check that there is adequate documentation for inspection sub-items with condition ratings of 6 or lower.

5. Check that all Photographs and/or Sketches have been properly cross referenced to the Inspection Report.

6. Check that there is consistency of information between the current Inspection Report and previous Inspection Reports, as well as the Dive Report and/or Rating Report, if applicable.

7. Check that proper documentation was incorporated into the inspection report for any changes that may have occurred from the previous SI&A and previous Inspection Report.

8. Review of all Items in the SI&A after data entry to check that they have been properly and correctly entered.

9. For Initial Inventory Inspections, a check of the inventory data on the SI&A against the construction plans to ensure that the data is consistent.

10. For every initial inspection, a set of Inventory Photos has been taken and included in the report and saved in 4D.

11. For every routine inspection, an Element Level inspection created with the routine inspection shall be reviewed for accuracy, including elements, quantities and condition states.

5.2.2 Inspection Team Field Evaluation Procedures

The Quality Control Engineer (DBIE) shall be required to spot check the inspection teams performance working in the field on a monthly basis. Spot checking is defined as a brief visit to assess safety and inspection methods employed by the inspection teams during the inspection of the structure. The Quality Control Engineer shall keep a log of the dates, teams, and bridges field inspected and shall have the log available to present to FHWA on the FHWA's yearly review. The Quality Control Engineer shall document the field visits and shall prepare an Inspection Team Field Evaluation Form, see Attachment 5-1.

5.2.3 Evaluation of Structure's Assigned a SD Classification

Upon notification from a Team Leader of their decision to lower the numerical condition coding of a structure to a 4, or from a 4 to a 3, for Item 58, Item 59, Item 60, and Item 62 (refer to Section 4.5.10), the DBIE shall be responsible to field verify the decision and concur with the decision.

It is preferred that the Team Leader notify the DBIE of their decision when they are in the field so that the DBIE may utilize the traffic set up or the inspection equipment that the Team Leader is using. If the DBIE concurs with the decision to reduce the numerical condition coding of the structure, the DBIE will ensure the data entry into 4D is revised to reflect the date of the inspection report or special member inspection report and the inspection frequency reflects the new condition.

The DBIE shall notify the District Bridge Engineer, Bridge Inspection Engineer and Area Bridge Inspection Engineer when a structure's numerical condition coding is lowered to a numerical value of a 4 or less, which would classify it as a Structurally Deficient Structure. This notification shall be via an email specifying the Bridge Number and BIN Number as well as the Sub-Item(s) that dropped the condition.

5.3 QUALITY ASSURANCE ENGINEER

The review by the Quality Assurance Engineer (ABIE) will include the checking of the compliance of inspection data with the Federal and MassDOT requirements. As a minimum, the Quality Assurance Engineer shall review 100% of the inspection reports with numerical condition rating of 4 or less for Items 58, 59, 60, or 62. Also the Quality Assurance Engineer shall review a minimum of 10% of all reports for completeness. Upon completion of the review by the ABIE, he/she will check off on 4D whether the review was a regular review or an in depth review.

The Quality Assurance Engineer is responsible for ensuring that the defined quality control procedures are enforced in his/her respective Districts. A review includes all aspects of functions to ensure adherence to Federal and State inspection criteria, laws, codes, standards, and regulatory requirements.

Also, the review may include the evaluation of inspection personnel's choice of inspection equipment, information retrieval methods, investigational processes, time and frequency of required inspectional services, etc.

5.4 QUALITY ASSURANCE SUPERVISOR

The Quality Assurance Supervisor is the Bridge Inspection Engineer (BIE). The QA Supervisor has the responsibility to assure that all aspects of the bridge inspection program adhere to Federal and State inspection criteria, laws, codes, standards and regulatory requirements. He/she assures that the inspection staff is qualified and properly trained, that their performance meets acceptable standards and that inspections are completed in an acceptable time frame.

The Bridge Inspection Engineer's duties include assuring that MassDOT inspection personnel maintain the most current and applicable training and education that are required of the position. He/she shall maintain a current list of all qualified bridge inspection personnel with their most current personal data regarding titles, duties, education, certification and training. Copies of certificates should be maintained in a personnel file for each.

Bridge inspection consultants should also be required to provide the BIE annually with a list of their bridge inspection personnel with information required as stated above. The list should be updated as new employees are added to the consultant's inspection organization.

The Quality Assurance Supervisor is also charged with review of personnel performance evaluations and field and report evaluations to insure that bridge inspection staff are performing within the required parameters of the position description. Review may also include checking if personnel assignments and job descriptions need to be redefined and whether recommendations to the State Bridge Engineer need to be made.

The Quality Assurance Supervisor shall oversee and verify that corrective measures have been instituted when necessary and that such measures are implemented fully.

5.5 INSPECTION TEAM FIELD EVALUATION

The Inspection teams shall be field evaluated by the Quality Assurance Engineer (ABIE) and assisted by the Quality Control Engineer (DBIE). The purpose of the Field Evaluation is to establish a uniform method of evaluation for the field performance of a bridge inspection team.

5.5.1 Inspection Team Field Evaluation Procedures

This procedure shall be used as a basis for a bridge inspection field evaluation. This evaluation shall document the arrival time, set-up time, preparations made for equipment, safety conformance, access methods, and the quality and thoroughness of each inspection team's activities. It should also note whether or not safety equipment was properly used, whether appropriate access methods were used, and an evaluation of whether the inspection served its desired purpose.

Every MassDOT inspection team leader shall be evaluated in the field at least twice a calendar year. Also, every Consultant Firm shall be evaluated in the field at least once a calendar year.

After each field evaluation the Evaluation Team shall fill out an Inspection Team Field Evaluation Form (see Attachment 5-1: Inspection Team Field Evaluation Form) and shall discuss the result of its findings with the inspection team, so any improvement, as needed, can be initiated more quickly.

If a team field evaluation by the Quality Assurance Engineer (ABIE) and the Quality Control Engineer (DBIE) results in an unsatisfactory review of the actual inspection performed by the Team Leader, then the ABIE shall notify (via email) the Bridge Inspection Engineer, District Bridge Engineer and the Team Leader of the result of the field evaluation. The Team Leader shall then address the comments for the unsatisfactory review and shall forward them to the Bridge Inspection Engineer, Area Bridge Inspection Engineer, District Bridge Engineer and District Bridge Inspection Engineer. The ABIE shall then randomly perform another field evaluation on an inspection done by the same Team Leader not less than two months from the date of the unsatisfactory field evaluation.

5.6 INSPECTION TEAM REPORT EVALUATION

The inspection reports prepared by the inspection teams shall be field evaluated by a review team consisting of the Quality Assurance Engineer (ABIE) and the Quality Control Engineer (DBIE). The evaluation is conducted to ensure a uniform quality of the individual bridge inspection report. Also, the review is to monitor the inspection for completeness, thoroughness, consistency, accuracy and standardization. It is recommended that an evaluation be made soon after an inspection so that conditions will not have changed.

5.6.1 Inspection Team Report Evaluation Procedures

This procedure shall be used to form the basis of a bridge inspection report evaluation. The report shall list the structure type, team, and comparisons of the previous and current (and, if available the Review Team Inspection Report) for the Deck, Superstructure, and Substructure of a particular bridge. This procedure shall be undertaken in the field. Also the report shall address the documentation provided by the inspection team with a particular emphasis on sketches, photographs and detailed explanations. Conclusions shall be checked to verify that they are logically stated and correct and that they were independently checked by the Review Team. Finally an overall evaluation shall be given of the inspection report.

Reports by each MassDOT inspection team leader shall be evaluated at least twice a calendar year.

After each inspection report evaluation, the Evaluation Team shall fill out an Inspection Report Evaluation Form (see Attachment 5-2: Inspection Team Report Evaluation Form) and shall discuss the result of its findings with the inspection team, so any improvement, as needed, can be initiated more quickly.

If an evaluation by the Quality Assurance Engineer (ABIE) and the Quality Control Engineer (DBIE) results in an unsatisfactory review of the report prepared by the Team Leader, then the ABIE shall notify (via email) the Bridge Inspection Engineer, District Bridge Engineer and the Team Leader of the result of the report evaluation. The Team Leader shall then address and correct the changes that the Quality Assurance Engineer (ABIE) and the Quality Control Engineer (DBIE) observed in the prepared report and shall resubmit the report for review. The ABIE shall then randomly perform another report evaluation on a report prepared by the same Team Leader not less than two months from the date of the unsatisfactory evaluation.

5.7 CHAPTER 5 ATTACHMENTS

INSPECTION TEAM FIELD EVALUATION FORM

DISTRICT: _____ DATE OF INSPECTION: _____ TIME: _____

TEAM LEADER: _____

TEAM MEMBER(S): _____

TYPE OF INSPECTION: _____

STRUCTURE NUMBER: _____

LOCATION: _____

1. Did the team arrive at the bridge in a timely manner? __Yes __No

Comments: _____

2. Rate the degree to which the team sets-up to inspect the bridge:

__ Satisfactory __ Needs Improvement __ Unsatisfactory

Comments: _____

3. Rate the degree to which the team is properly equipped for the inspection:

__ Satisfactory __ Needs Improvement __ Unsatisfactory

Comments: _____

4. Rate the degree to which team members observe safety rules and wear proper safety equipment:

__ Satisfactory __ Needs Improvement __ Unsatisfactory

Comments: _____

Page **1** of **2**

Attachment 5-1: Inspection Team Field Evaluation Form, Page 1 of 2

5. What method of access was used? (Ladder, Snooper, etc.)

_____

6. Was access method appropriate? _Yes _No

Comments: _____

_____

7. Rate whether the inspection was sufficiently thorough enough to serve its desired purpose:

__ Satisfactory ___Needs Improvement __ Unsatisfactory

Comments:_____

_____

_____

8. Comments:

_____

_____

_____

9. Overall rating of inspection preparedness, quality and thoroughness by the team:

CHECK ONE: __Satisfactory ___Needs Improvement ___ Unsatisfactory

NAME: _____

TITLE: _____

DATE: _____

SIGNATURE: _____

Page **2** of **2**

Attachment 5-1: Inspection Team Field Evaluation Form, Page 2 of 2

INSPECTION TEAM REPORT EVALUATION

CITY/TOWN _____ BRIDGE NO./BIN _____

QA/QC REVIEW DATE _____ STRUCTURE NO. _____

43 - Structure Type _____ DISTRICT _____

07 - Facility Carried _____

06 - Features Intersected _____

REVIEW TEAM:

Quality Assurance Engineer (ABIE) _____

Team Leader _____

Team Member(s) _____

INSPECTION TEAM (From Report):

Quality Control Engineer (DBIE) _____

Team Leader _____

Team Member(s) _____

Date of Report _____ Type of Inspection _____

1. Is Quality Control Engineer Qualified? __Yes __No

2. Is Team leader Qualified? __Yes __No

3. Were all items completed? __Yes __No

4. Were conclusions logically stated and correct? __Yes __No

5. List items which changed from previous report:

_____

_____

_____

Page 1 of 5

Attachment 5-2: Inspection Team Report Evaluation Form, Page 1 of 5

INSPECTION TEAM REPORT EVALUATION

ITEM 58. DECK	Previous	Current	Review Team	Adeq. Doc. (Y/N)	Remarks
Overall Condition					

COMMENTS:

Page 2 of 5

Attachment 5-2: Inspection Team Report Evaluation Form, Page 2 of 5

INSPECTION TEAM REPORT EVALUATION

ITEM 59. SUPERSTRUCTURE	Previous	Current	Review Team	Adeq. Doc. (Y/N)	Remarks
Overall Condition					

COMMENTS:

Page 3 of 5

Attachment 5-2: Inspection Team Report Evaluation Form, Page 3 of 5

INSPECTION TEAM REPORT EVALUATION

ITEM 60. SUBSTRUCTURE	Previous	Current	Review Team	Adeq. Doc. (Y/N)	Remarks
1. Abutments					
2. Piers or Bents					
3. Piles Bents					
Overall Condition					

COMMENTS:

Attachment 5-2: Inspection Team Report Evaluation Form, Page 4 of 5

INSPECTION TEAM REPORT EVALUATION

SUMMATION

1. Conclusions:

_____
_____
_____
_____

2. Recommendations for Corrective Action:

_____
_____
_____
_____
_____
_____
_____
_____
_____

3. Evaluation of Report:

__ Satisfactory __ Unsatisfactory __ Need Improvement

4. If needs improvements, has Report been discussed with Team and Report corrected?

__Yes __No

5. Remarks:

_____
_____
_____

Page 5 of 5

Attachment 5-2: Inspection Team Report Evaluation Form, Page 5 of 5

CHAPTER 6
RATING, POSTING AND CLOSING OF BRIDGES

6.1 INTRODUCTION

The rating of a bridge to determine its load carrying capacity and, if needed, posting it for that load, is just as important in helping to ensure the safety of the traveling public as is a bridge inspection. In addition, federal NBIS regulations require that each bridge in the National Bridge Inventory be rated and be posted if the maximum unrestricted legal loads in a state exceed the operating rating of the bridge.

In Massachusetts, M.G.L. Chapter 85 Section 35 makes MassDOT responsible for determining the maximum load that a municipal bridge on a public highway can safely carry. Furthermore, M.G.L. Chapter 85 Section 34 makes the owner of the bridge, whether it is MassDOT, another state agency, municipality or other owner, responsible for maintaining the posting signs denoting the maximum weight of vehicle with load that the bridge may safely carry.

In order to comply with the NBIS and M.G.L., MassDOT has undertaken the rating of all MassDOT and municipal bridges, in addition to their inventory and inspection, and reports the results to FHWA on the SI&A record for each bridge. If posting is needed, the State Bridge Engineer determines what that posting should be and informs the municipality by letter. MassDOT bridges are posted by official action of the MassDOT Highway Administrator based on the State Bridge Engineer's recommendation.

When MassDOT rates a bridge, a rating report is produced in accordance with Chapter 7 of the MassDOT Bridge Manual, which documents all of the calculations and assumptions that were used in determining the safe load carrying capacity of the bridge. The rating report considers two load rating levels, Inventory and Operating. The Inventory Rating Level denotes the maximum weight of vehicle that can go over the bridge on a regular basis and it is equivalent to the Factors of Safety used when designing a new bridge. The Operating Rating Level denotes the maximum weight of vehicle that can go over the bridge on an infrequent basis.

The statutory rating vehicles used for rating purposes are defined as: H20 (2 axle) with a total vehicle weight of 20 tons; Type 3 (3 axle) with a total vehicle weight of 25 tons; Types 3S2 (5 axle) with a total vehicle weight of 36 tons; and the HS20 (3 axle tractor trailer) with a total vehicle weight of 36 tons.

The color of the rating report cover may be green, yellow or red, depending on the inventory rating of the statutory rating vehicles. A green cover signifies that the inventory rating of all statutory rating vehicles is greater than their statutory limits. A yellow cover signifies that the inventory rating for any one of the four statutory rating vehicles is less than its statutory limit but greater than 6 tons. A red cover signifies that the inventory rating for any one of the four statutory rating vehicles is 6 tons or less.

The posting vehicles are the vehicles whose load rating is used when the bridge is posted. MassDOT currently uses the following posting trucks: H20 truck, Type 3 truck, and the Type 3S2 truck. The posting of a bridge is based primarily on the Inventory Rating Level.

This chapter will discuss factors that warrant a rating or a re-rating of a bridge and will outline the procedures to be followed when requesting a rating or re-rating of the bridge. In addition, this chapter will outline the procedures required to log and process rating reports, including the additional procedures required for processing red cover rating reports, as well as the procedures associated with the closing of a bridge. Finally,

this chapter will outline procedures to be used to process a completed rating report and discuss any necessary follow up field procedures associated with implementing the recommendations presented in the rating report.

6.2 FACTORS THAT WARRANT A RATING/RE-RATING REQUEST

All bridges require a rating report to be produced and incorporated into the bridge's history file. Newer bridges have rating reports produced once construction has been completed and Bridge Inspection has completed the Initial Routine Inspection of the structure. In addition, it is also very important to have a rating that reflects the structure's most current condition.

Existing bridges with existing ratings reports require a re-rating when a condition may affect the live load carrying capacity of the structure. Examples of factors that can lead to a re-rating request are as follows:

- A reduced section capacity to bridge elements at critical locations due to deterioration or structural damage
- The addition or reduction of dead load on a structure, such as the addition of additional wearing surface material or addition of a transfer slab on prestressed deck beam structures or any alterations to concrete encased steel beam structures
- The loss of prestressing strands on prestressed concrete beam structures
- Repairs or alterations to structural steel members that result in an increase to section capacity at critical section locations
- Long term changes to traffic patterns such as lane additions or lane restrictions
- Outdated older rating reports

Although most requests for re-rating are obvious, such as the completion of a rehabilitation contract, or completion of a resurfacing project, etc., not all needs for a re-rating are so evident. Detailed field observation is required to expose the changes and therefore the District Bridge Inspection Units must provide the measurements, sketches and detailed dimensioning necessary to verify and recommend that a re-rating be initiated. This information should be clear and concise with enough information for the Bridge Inspection Engineer or his/her staff personnel to concur and make a re-rating assignment or to reject the request if deemed in-appropriate.

It should be noted that, generally, deterioration of the concrete deck (by itself) supported on a stringer type structure would not warrant a request for re-rating of the structure.

6.3 PROCEDURES FOR REQUESTING A RATING/RE-RATING OF A STRUCTURE

When it is determined that a structure may require a rating/ re-rating, the District Bridge Inspection Engineer or his/her's designee, shall prepare the request using the bridge rating/re-rating form (See Attachment 6-1, Request for Bridge Rating/Re-Rating Form). The form provides a checklist of items to be filled out and submitted from the DBIE through the DBE to the ABIE.

A request for bridge rating/re-rating may originate from the Team Leader, but may also be requested by the State Bridge Engineer, the District Bridge Engineer, the District Highway Director, Area Bridge Inspection Engineer or the District Bridge Inspection Engineer. The request shall contain the reason for the request with documented information and shall be verified by the Area Bridge Inspection Engineer.

The DBIE shall assign a priority to the rating/re-rating request. The rating priority shall be classified as High, Medium, or Low. The priority ranking should reflect the severity of the conditions observed in relation to the capacity stated in the existing rating report for the structures elements. For example, a member that has extensive section loss and has a stated inventory rating capacity near statutory loading levels, should be assigned a high priority.

The Area Inspection Engineer will log the request in 4D. The ABIE will confirm the need for the rating and indicate if any plans, previous rating reports and prior VIRTIS rating files exist for the structure. For a new or recently rehabilitated structure, the ABIE will indicate the Project Number of the rehabilitation and the Contract Number for the Design Consultant for the rehabilitation and include that information onto the rating /re-rating request form. The ABIE shall also check the Bridge Inspection database to ensure that the structure has not already been assigned to a consultant firm for re-rating.

Upon completion of the review, the ABIE will approve or reject the request in 4D. If approved the ABIE shall forward the request to the Bridge Inspection Engineer, who shall review the request and add his/her comments and then forward the request to the State Bridge Engineer for concurrence or rejection. Upon receiving the request back from the State Bridge Engineer with his recommendation, the Bridge Inspection Engineer shall assign the structure to a rating consultant to perform a new rating.

A 10 year evaluation must be done on all structures that have rating reports that are 10 years old or older. The purpose of the 10 year evaluation is for the DBIE to thoroughly review the present conditions that a structure exhibits and compare those conditions to the assumptions contained in the rating report on file in order to ensure that the rating report is still valid.

A form shall be filled out and submitted by the DBIE containing their recommendation to either re-rate the bridge or defer the re-rating. A reason for the recommendation will be required for either case. The form shall be completed and submitted on every 10^{th} year anniversary of the latest rating report that exists for a structure. The form will then be forwarded to the ABIE, who shall place it in the NBIS history file. Refer to Attachment 6-2 for a copy of the 10 Year Rating Evaluation Form.

It should be noted that the request for rating or re-rating block on any inspection report shall be continually filled out by the team leaders. The DBIE shall then review the request for rating or re-rating block on every inspection report. If the DBIE does not concur with the recommendations in the rating block, the DBIE shall then state and write in the rating block why he/she does not agree.

6.4 PROCEDURES FOR LOGGING, AND ROUTING OF RATINGS

When the completed rating reports are received by the Bridge Inspection Engineer from the rating consultant engineering firm, the BIE shall forward the two copies of the rating reports to the ABIE. The ABIE shall log the reports into the 4D system and forward the reports to the bridge inspection staff engineer, who in turn, forwards the report to the Ratings and Overload Engineer for review. If a red cover rating report is delivered to the BIE, then a separate process and procedure will be followed in the review and processing of these reports. This process will be described in further detail in Section 6.6.

If the review leads to an unsatisfactory discovery of contents, then R&O Engineer shall prepare a memorandum with all of the reviewers' comments to be addressed and send the IOM to the Bridge Inspection Engineer. The BIE shall forward the reports and comments to the ABIE. The ABIE shall log the action taken into the 4D system and forward the rating reports and comments to the staff engineer, who in turn, will send

back the material to the consultant engineering firm. Upon receiving the corrected ratings reports with comments addressed, the rating reports will follow the steps outlined previously above.

The procedure above will be followed until an acceptable Rating is approved.

6.5 PROCEDURES FOR PROCESSING RATING REPORTS BY RATINGS & OVERLOAD UNIT

The Ratings & Overload Engineer or designee shall review the summary sheet contained in the rating report to the corresponding color of the rating report so as to ensure that the color meets the guidelines of the Bridge Manual and check for rating completeness. The Ratings & Overload Engineer will then assign the rating report to a member of the Ratings & Overload Unit for review. Upon receiving the rating reports from BIE, the Ratings and Overload Engineer will be responsible to care for all copies until such time as the reports are returned for final processing or returned to the consultant for revisions or corrections. Upon satisfactory review and concurrence of the contents and recommendations of the rating report, the Ratings & Overload unit shall prepare a memo to the NBIS file, see Attachment 6-3, for the State Bridge Engineer's review and signature.

The rating reviewer will review all of the methods, assumptions and calculations by which the Consultant determined the rating to be in conformance with Chapter 7 of the Bridge Manual. The rating reviewer will also review the Consultant's recommendations, check that they are precise, unambiguous, are substantiated by the appropriate calculations.

MassDOT procedures for determining the proper posting of a bridge is outlined below. This procedure shall be implemented by the Ratings & Overload Unit during their review of rating reports and in their recommendations to the State Bridge Engineer.

Bridges will only be posted if a rating report with full calculations, accepted by the State Bridge Engineer exists and a posting has been recommended by the State Bridge Engineer. The only exceptions are as follows:

1. If bridge conditions have deteriorated to the point at which it is obvious that the load carrying capacity has been diminished and public safety is in jeopardy, an emergency posting may be imposed by the State Bridge Engineer.

2. A rating report based upon engineering judgment accepted by the State Bridge Engineer which states that although the bridge had been carrying loads, it is in the interest of public safety to post the bridge.

The posting recommendations will be based upon the Inventory Rating Levels for the posting trucks. However, depending on the condition of the bridge and the structure type, the following provisions may also be considered in determining the posting recommendation:

1. If an overstress which is less than or equal to 5% over the Inventory Rating Levels results in statutory weights for all posting trucks, then the posting may be Waived at the discretion of the State Bridge Engineer.

2. If an overstress over Inventory Rating Levels which is greater than 5% but less than or equal to 10% results in statutory weights for all posting trucks, then the bridge may be posted for the statutory limits for all three posting trucks at the discretion of the State Bridge Engineer.

Notwithstanding the provisions stated above, the State Bridge Engineer reserves the right to waive a posting on a case by case basis due to extenuating circumstances if it is determined that the bridge will still be safe for the traffic that will be using the bridge. The basis for such a waiver will be outlined in the State Bridge Engineer's "Memo to the NBIS File".

6.6 PROCEDURES FOR PROCESSING RATING REPORTS WITH RED COVERS

The purpose of this Section is to provide a standard procedure and policy on processing Rating Reports which have Red Covers. Rating reports with red covers shall be classified as Red Cover reports if the recommended rating of any of the four rating vehicles is 6 Tons or less.

While an analysis is being performed on a structure that has been assigned to a consultant engineering firm or to the Ratings and Overload Unit and the analysis indicates that the recommended rating of any of the four rating vehicles will be 6 Tons or less, the consultant firm or the R&O Unit shall immediately notify the Department (the State Bridge Engineer or Bridge Inspection Engineer or Ratings and Overloads Engineer) and receive further instructions on how to submit the report.

Upon receiving the ratings, the State Bridge Engineer's Administrative staff will submit all Red Cover ratings to the State Bridge Engineer along with the letter of transmittal. Two separate log books to track Red Cover ratings will be created see Attachments 6-4; Red Cover Rating Report Log, one book will be with the State Bridge Engineer and the other with the Bridge Inspection Engineer.

The State Bridge Engineer (or Assistant State Bridge Engineer) will log the rating in his log book, keep one copy of the rating report for his/her immediate review, and send the remainder along with the letter of transmittal to the Bridge Inspection Engineer. Upon receipt of the rating books, the Bridge Inspection Engineer will log the rating in the logbook and in the 4D system and notify the ABIE of its submission.

The State Bridge Engineer will review the Red Cover rating recommendations and determine if immediate implementation is required or if an engineering review is required. This action will be written down, dated, noted to whom it is assigned and attached to the rating book and forwarded for execution. This action will also be noted in the State Bridge Engineer's log book. A copy of this action form will be forwarded to the Bridge Inspection Engineer. See Attachment 6-5, Red Cover Rating Tracking Form, for the standard Red Cover Rating tracking form to be filled out by the State Bridge Engineer.

Upon the State Bridge Engineer's decision that the bridge is to be posted or closed immediately while the rating report is in Engineering Review, the procedures outlined in Section 6.9 "Procedure for closing a bridge due to inspection or a prepared bridge rating report" shall be followed.

Upon the State Bridge Engineer's decision that no immediate action will be required, the review of the report by the R&O unit is high priority and shall be completed in a timely manner.

The engineering review performed by the Rating and Overloads Unit shall include a review all of the methods, assumptions and calculations by which the Consultant determined the rating. The rating reviewer will also review the Consultant's recommendations, check that they are precise, unambiguous, are substantiated by the appropriate calculations.

The State Bridge Engineer and the Bridge Inspection Engineer will compare their log books periodically to ensure that both are complete and exact. The State Bridge Engineer will review the status of the required action

on each rating on a monthly basis. Upon receipt of the rating reviewer's report, the State Bridge Engineer will review it and make sure that all of the Consultant's recommendations have been addressed.

6.7 DOCUMENTATION AND DISTRIBUTION OF APPROVED RATINGS

Once the State Bridge Engineer has signed the NBIS memo for the rating report, the rating reports and signed NBIS memo shall be delivered to the Bridge Inspection Engineer, who in turn, will forward them to the ABIE. The ABIE will update in 4D the Posting Status and Posting Date as outlined in Section 6.7.1. The reports will then be given to the Ratings and Overloads Engineer for the updating in 4D of the Items 63 trough Item 66 along with the inventory, operating and recommended loads as outlined in Section 6.7.1. The ABIE will prepare the necessary correspondence and process and distribute the rating reports as outlined. The ABIE will also prepare the letter of completion, which contains the consultant's evaluation score, to the consultant firm that has performed the bridge rating.

If the bridge is owned by MassDOT and requires posting, then the Area Bridge Inspection Engineer shall prepare a Miscellaneous Items for MassDOT Highway Board. After the Board approves the posting recommendation, the Area Bridge Inspection Engineer shall prepare an Interoffice Memorandum (for the State Bridge Engineer's signature) to the District Highway Director regarding the required action. The District Bridge Engineer is responsible for notify municipalities of posting recommendations.

If the bridge is owned by a city or town, then the Area Bridge Inspection Engineer shall prepare a letter (for the State Bridge Engineer's signature) of notification of required action for the bridge to the Municipality and the District Highway Director.

The Area Bridge Inspection Engineer then forwards one copy of the letter written to the municipalities and District Highway Directors along with the NBIS File memo to the District Bridge Inspection Engineer.

Upon completion, the Bridge Inspection Engineer or his/her designee will give the rating report book to the bridge inspection staff engineer charged with filing the reports and copies of the letters (bound into the front of the rating report) in the Bridge Rating File.

Summarized and referred to in Attachment 6-6 thru 6-17 are typical sample memorandums or letters that are generated via 4D in the processing of rating reports by the Area Bridge Inspection Engineers. These attachments are listed as follows:

- Attachment 6-6: Sample IOM to DHD No Posting of State Owned Structure
- Attachment 6-7: Sample Letter to City/Town No Posting of Municipally Owned Structure
- Attachment 6-8: Sample IOM to DHD Posting State Owned Structure
- Attachment 6-9: Sample IOM to DHD Posting Municipally Owned Structure
- Attachment 6-10: Sample Letter to City/Town Posting of Municipally Owned Structure
- Attachment 6-11: Sample IOM to DHD Remain Posted of State Owned Structure
- Attachment 6-12: Sample Letter to City/Town Remain Posted Municipally Owned Structure
- Attachment 6-13: Sample IOM to DHD Waiving the Posting State Owned Structure
- Attachment 6-14: Sample Letter to City/Town Waiving the Posting of Municipally Owned Structure
- Attachment 6-15: Sample IOM to DHD Closure of State Owned Structure
- Attachment 6-16: Sample Letter to City/Town Closure of Municipally Owned Structure
- Attachment 6-17: Miscellaneous Item Form

6.7.1 Procedures on Posting and Rating Items on the SI&A

The Area Bridge Inspection Engineer and the Ratings and Overloads Engineer are responsible for the proper coding of the completed Ratings as outlined below. Information to be entered on the SI&A comes from the completed NBIS File Memo (see Attachment 6-3).

The following definitions shall be utilized in this section.

- MM/DD/YYYY = Date coded in the following format: Month/Day/Year

  *(1) = For State owned bridges
  *(2) = For Municipally owned bridges

- **POSTING LOADS** = The following Massachusetts Specific Inventory Items:
  RECOMMENDED 2 AXLES, RECOMMENDED 3 AXLES, RECOMMENDED 5 AXLES

- **LOAD ITEMS** = The following Massachusetts Specific Inventory Items: OPR H20, OPR Type 3, OPR 3S2, OPR HS, INV H20, INV TYPE 3, INV 3S2, INV HS

The Posting Loads are found under the Field Posting section of the SI&A. The Load Items are found under the Rating Loads section of the SI&A. These sections of the SI&A that are to be updated by ABIE and R&O Engineer are shown on Attachment 6-18.

If an accepted rating report, with full calculations, exists and a POSTING has been recommended by the State Bridge Engineer, the following items shall be coded as shown:

POSTING DATE	MM/DD/YYYY	"date of Board Action"*(1) "date of State Bridge Engineers Memo to NBIS file"*(2)
POSTING STATUS	**POSTED**	"coded as shown"
POSTING LOADS		"code according to MassDOT Supplemental Coding Guide"
LOAD ITEMS		"code according to MassDOT Supplemental Coding Guide"

If an accepted rating report, with full calculations, exists and shows loading of equal or exceeding STATUTORY load and the State Bridge Engineer concurs with the findings, the following items shall be coded as shown:

POSTING DATE	MM/DD/YYYY	"date of State Bridge Engineers' memo to NBIS file"
POSTING STATUS	**LEGAL**	"coded as shown"
POSTING LOADS		"coded "blank" for all Items"
LOAD ITEMS		"code according to MassDOT Supplemental Coding Guide"

If an accepted rating report, based on Engineering Judgment exists and it recommends **no** posting required and the Director of Bridges and Structures concurs with the findings, the following items shall be coded as shown:

POSTING DATE	MM/DD/YYYY	"date of State Bridge Engineers' Memo to NBIS file"
POSTING STATUS	**EJDMT**	"coded as shown"
POSTING LOADS		"coded "blank" for all Items"

LOAD ITEMS		"code according to MassDOT Supplemental Coding Guide"

If an accepted rating report, based on Engineering Judgment exists and it recommends posting of the bridge and the State Bridge Engineer concurs with the findings, the following items shall be coded as shown:

POSTING DATE	MM/DD/YYYY	"date of Board Action"*(1) "date of State Bridge Engineers' Memo to NBIS file"*(2)
POSTING STATUS	**EJDMT**	"coded as shown"
POSTING LOADS		"code according to MassDOT Supplemental Coding Guide"
LOAD ITEMS		"code according to MassDOT Supplemental Coding Guide"

When a posting is WAIVED, the following items shall be coded as indicated to represent the WAIVED category:

POSTING DATE	MM/DD/YYYY	"date of State Bridge Engineers letter to NBIS file"
POSTING STATUS	**WAIVED**	"coded as shown"
POSTING LOADS		"coded "blank" for all Items"
LOAD ITEMS		"code according to MassDOT Supplemental Coding Guide"

If an accepted rating report, with full calculations, exists and a recommendation to CLOSE has been determined by the State Bridge Engineer, the following items shall be coded as shown:

POSTING DATE	MM/DD/YYYY	"date of closing"
POSTING STATUS	**CLOSED**	"coded as shown"
POSTING LOADS		"coded as follows:"
	RECOMMENDED 2 AXLES = 00	
	RECOMMENDED 3 AXLES = 00	
	RECOMMENDED 5 AXLES = 00	
LOAD ITEMS		"code according to MassDOT Supplemental Coding Guide"

If any changes are required on any of the above stated items, the DBIE shall request changes to be made by marking up an SI&A and submitting it to the ABIE.

6.8 BRIDGE POSTING REDUCTION BASED ON AN INSPECTION

The purpose of this section is to establish a procedure for the reporting of a changed condition noted during a bridge inspection which may require the structure to be posted or a reduction of the existing posting. This procedure shall be used for all bridges owned by MassDOT or Municipalities.

When performing any inspection on a bridge upon observation of a changed condition which in the opinion of the inspection team leader may result in posting or a reduction of the existing posting of a bridge, the Inspection Team Leader (TL) shall notify the District Bridge Inspection Engineer (DBIE). The Inspection Team Leader will complete the report in the 4D in a timely manner. The DBIE will review the report and notify the ABIE that the report is completed and along with the request to perform a rating/re-rating.

Upon review by the State Bridge Engineer, recommendations may require implementation prior to the completion and approval of the load rating. Recommendations may be, but are not limited to, lane restrictions, posting reduction or closure.

Once the recommendation from the State Bridge Engineer is documented in the NBIS memo to the file the ABIE will prepare and process the paperwork as outlined in Section 6.7.

The ABIE will provide the bridge inspection staff engineer with the completed documentation (NBIS File memo) to incorporate within the existing rating report. The DBIE will be responsible for the updating of the district's copy of the rating report.

6.9 PROCEDURES FOR CLOSING A BRIDGE DUE TO AN INSPECTION OR A PREPARED BRIDGE RATING REPORT

The purpose of this section is to establish a procedure for the reporting of any unsafe condition noted during a bridge inspection or as a result of a Rating Report, which would require the bridge to be **CLOSED**. This procedure shall be used for all MassDOT and Municipally-owned bridges. For the purposes of this Section, CLOSURE may be taken to refer to either full or partial closure of a bridge, depending on the situation.

6.9.1 Closure of a Bridge Due To an Inspection

It shall be noted, that in an event a structural defect poses immediate danger to public safety and needs to be closed immediately, the District Bridge Engineer at his/her discretion shall close the bridge (fully or partially) and as soon as possible and implement the following procedures. The Inspection Team Leader will need to document their findings as outlined in Section 4.7 CS/I & CH/I Procedure and Documentation.

1. Upon observation of an unsafe condition which in the opinion of the Inspection Team requires closure of a MassDOT bridge, the Inspection Team Leader (TL) shall immediately verbally notify the District Bridge Inspection Engineer (DBIE) who after verification shall immediately verbally notify the District Bridge Engineer (who will immediately notify the District Highway Director) and Area Engineer (who in return will immediately notify the Bridge Inspection Engineer and the State Bridge Engineer). All of the above notifications shall be documented in the inspection report prepared by the Team Leader.

2. The State Bridge Engineer or his/her designee after making his/her final decision will send an email notification to the Administrator, Chief Engineer, District Highway Director, and the Director of Communications advising them of the decision to close the bridge, followed by a phone call to each to discuss the closure with available information at that time. The following actions shall transpire after this notification:

    - District Highway Director (or his/her designee) shall do the following:

        - Contact the community and advise them of the bridge condition that warrants closure
        - Determine the potential impacts to the community
        - Assess the possible political and press ramifications
        - Assess the possible detour route if necessary
        - Determine if MassDOT assistance is needed/recommended (for Municipally owned bridges)
        - Forward this information to the Administrator, Chief Engineer, State Bridge Engineer and Director of Communications and follow up with a phone call to ensure that there are no unexpected situations

- District Bridge Inspection Engineer (DBIE) shall do the following:

  - Indicate the type of the structure
  - Indicate the owner of the structure
  - Indicate the type of inspection (Routine, Special Member, Fracture Critical)
  - Indicate the inspection cycle
  - Indicate the Average Daily Traffic (from the SI&A)
  - Indicate the length of the detour (if applicable) from the SI&A
  - Forward this information to the Area Bridge Engineer and the District Bridge Engineer.

- Area Bridge Inspection Engineer shall do the following:

  - Forward the information received from the DBIE to the Bridge Inspection Engineer who then forwards the information to the State Bridge Engineer or his designee

- The State Bridge Engineer or his/her designee shall do the following:

  - Review the information available and discuss with Bridge Inspection Staff to determine if it is likely that repairs can be performed to bring the loading back to level it was at (if a restriction is recommended)
  - Review the information available and discuss with Bridge Inspection Staff to determine if is likely that repairs can be performed to reopen the structure (if closure is recommended)
  - Forward the information to the Administrator, Chief Engineer, District Highway Director, and Director of Communications and follow up with a phone call to ensure that there are no further issues

3. The State Bridge Engineer may request an evaluation either by the District Bridge Engineer or the Ratings & Overload Engineer.

4. The State Bridge Engineer or his/her designee then shall forward his/her decision by memo to the NBIS file to the Bridge Inspection Engineer (who in return will notify the Area Bridge Inspection Engineer, District Bridge Engineer and the District Bridge Inspection Engineer).

5. The Area Bridge Inspection Engineer will prepare an interoffice memorandum for the State Bridge Engineer's signature through the Chief Engineer to the District Highway Director in order to formally notify him/her of this bridge closure.

6.9.2 Closure of a Bridge Due To a Rating Report

After a thorough review has been performed by the Ratings and Overload Unit on a rating report and a recommendation to close or restrict a bridge is the outcome of the review and the State Bridge Engineer has determined action to be appropriate, he/she will send an email notification to the Administrator, Chief Engineer, District Highway Director, and the Director of Communications advising them of the decision to close the bridge, followed by a phone call to each to discuss the closure with available information at that time.

- District Highway Director shall do the following:

  - Contact the community and advise them of the closure

- Determine the potential impacts to the community
- Assess the possible political and press ramifications
- Assess a possible detour route if necessary
- Determine if MassDOT assistance is needed/recommended (for municipally owned bridges)
- Forward this information in to the Administrator, Chief Engineer, State Bridge Engineer, and Director of Communications and follow up with a phone call to ensure that there are no surprises

- The State Bridge Engineer shall do the following:

  - Indicate the type of structure
  - Indicate the owner of the structure
  - Indicate the date of the last inspection
  - Indicate the inspection cycle
  - Average Daily traffic (from SI&A)
  - Length of detour (if applicable) from SI&A
  - Determine if it is likely that repairs can be performed to reopen the structure (if closure is recommended)
  - Forward this information to the Administrator, Chief Engineer, District Highway Director, and Director of Communications and follow up with a phone call to each to ensure that there are no surprises

The State Bridge Engineer then shall forward his/her decision by memo to the NBIS file to the Bridge Inspection Engineer (who in return will notify the Area Bridge Inspection Engineer, the District Bridge Engineer and the District Bridge Inspection Engineer).

The Area Bridge Inspection Engineer will prepare a letter for the Chief Engineer's signature to the Municipality Officials; see Attachments 6-15 Sample IOM to DHD Closure of State Owned Structure and Attachment 6-16 Sample Letter to City/Town Closure of Municipally Owned Structure, in order to formally notify them of this bridge closure.

6.10 DUAL RECOMMENDATIONS

Upon completion of a rating report review by the Ratings & Overload Unit, there may be times that a dual recommendation may be contained in an NBIS memorandum signed by the State Bridge Engineer. An example of a NBIS memorandum containing a dual recommendation is attached in Attachment 6-19: NBIS Memorandum containing Dual Recommendations.

When a memo to the NBIS file is signed by the State Bridge Engineer containing dual recommendations the following procedure is to be implemented depending upon if the bridge is owned by MassDOT or a Municipality.

6.10.1 Dual Recommendations on Bridges Owned by MassDOT

After a thorough review of a rating report of a structure performed by the Ratings and Overload Unit and a dual recommendation has been offered to the District, for a MassDOT structure, through a NBIS memorandum signed by the State Bridge Engineer, the District Highway Director or his/her designee shall have five business

days to respond in writing as to the action the District is going to implement in relation to the dual recommendations contained in the NBIS memo. Specifically, the DHD will select which recommendation he/she will implement and notify the State Bridge Engineer of the time frame to carry out the actions that the district is preparing. If it is determined that the implementation time will be too great the District may be required to implement some type of remedial measure to ensure the safety of the motoring public. The following actions shall transpire after this notification has been received by the State Bridge Engineer;

- The Area Bridge Inspection Engineer shall do the following:
    - Scan and email a copy of the NBIS memorandum with any attachments to the District Bridge Engineer and District Bridge Inspection Engineer;
    - Follow up with a hard copy of the memorandum to the District Highway Director.
- The District Bridge Inspection Engineer shall do the following:
    - Receive the response /action to be taken by the District Bridge Engineer and the District highway Director.
    - Forward the response to the ABIE for incorporation into the NBIS file.

The ABIE will process the Rating report as outlined in Section 6.7. Verification that work has been performed is to be confirmed by a bridge inspection being performed.

6.10.2 Dual Recommendations on Bridges Owned by Municipalities

After a thorough review of a rating report of a structure performed by the Ratings and Overload Unit and a dual recommendation has been presented in the NBIS memorandum on a structure owned by a municipality, The Area Bridge Inspection Engineer shall prepare a letter to the Municipality from the State Bridge Engineer. The Municipal Representatives receiving the letter shall have ten business days to respond in writing as to the action the Municipality is going to implement in relation to the dual recommendations contained in the NBIS memo. Specifically, the Municipal Representative will select which recommendation the municipality will implement and notify the State Bridge Engineer of the time frame to carry out the actions that the municipality is preparing. If it is determined that the implementation time will be too great, the Municipality may be required to implement some type of remedial measure to ensure the safety of the motoring public. The following actions shall transpire after this notification has been received by the State Bridge Engineer;

- The Area Bridge Inspection Engineer shall do the following:
    - Scan and email a copy of the NBIS memorandum with any attachments to the District Bridge Engineer and District Bridge Inspection Engineer
    - Follow up with a hard copy of the memorandum to the District Highway Director
- The District Bridge Inspection Engineer shall do the following:
    - Receive the response/action to be taken by the Municipality and schedule an Other Inspection Report to document the response/action taken
    - Forward the completed Other Inspection report to the ABIE for incorporation into the NBIS file

The ABIE will process the Rating report as outlined in Section 6.7. Verification that work has been performed is to be confirmed by a bridge inspection being performed.

6.11 PROCEDURES FOR POSTING OF BRIDGES

To provide clear direction and policy for posting weight limits on bridges under the jurisdiction of the MassDOT or the municipal inventory under the NBIS Regulations. Also, to provide safeguards to check that bridges that require postings have appropriate visible signs and advance warning that weight limitations and detours may exist.

In relation to the discussion of this section, it is appropriate to define the following terms:

MUTCD = Manual on Uniform Traffic Control Devices (latest edition), Massachusetts uses the R12-5a as its sign Standard (see Attachment 6-20 Posting Sign Standard)

At Bridge Signs: Signs erected immediately in advance of the bridge being posted at a distance of not less than 100 feet (30.480 meters) from the bridge (MGL c. 85 s. 34)

Advance Warning Signs: Signs placed at approach road intersections or other points where a vehicle which exceeds the posted weight limits must detour or turn around.

In order for a bridge to be considered properly posted, an At Bridge Sign must be within visible distance of the structure and be erected facing each direction of traffic. If there is an intervening street between the sign and the bridge, an additional sign must be erected immediately adjacent to the bridge. These additional signs must be in place in order for the bridge to be considered properly posted.

The posting of a bridge shall include the installation of Advance Warning Signs as necessary; however, the absence of any of these Advance Warning Signs will not preclude a coding of "P" for Item 41.

6.11.1 Procedures for Posting of Bridges Owned by MassDOT

The State Bridge Engineer shall notify the District by memo of the posting recommendation and the District shall be responsible for erecting appropriate weight limit signs within the time limit specified in the memo. This time limit shall typically be 30 days after receipt of the State Bridge Engineer's posting recommendation, except in the following circumstances, in which case the time limit shall be 10 working days:

- If the recommended posting for any posting truck is for six (6) tons or less
- If the new calculated Operating Rating (the maximum permissible load that can use the bridge on an infrequent basis) is either:
    - Less than statutory in the case of an un-posted bridge, or
    - Less than the bridge's current posting in the case of a posted bridge

District Personnel shall determine the exact location of At Bridge signs and Advance Warning signs. Locations of At Bridge signs and Advance Warning signs and date of erection of signs shall be reported to the District Bridge Inspection Unit in order to update the bridge's inventory record. For the follow up procedure to ensure the signs have been properly placed is in Section 6.12.

If posting signs are missing, the DBIE shall request signs to be installed, refer to Attachment 6-21, MassDOT Missing Posting Signs Notification Form-State Owned. The time frame for replacing missing posting signs shall be the same as the time frame used when the signs were initially installed.

6.11.2 Procedures for Posting of Bridges Owned by Municipalities

The State Bridge Engineer shall notify the municipality by letter of the recommended weight limits for posting. In the letter, the municipality shall be allowed 30 days from the date of the initial notification to erect these signs, except in the following circumstances, in which case, the time limit shall be 15 working days:

- If the recommended posting for any posting truck is for six (6) tons or less
- If the new calculated Operating Rating (the maximum permissible load that can use the bridge on an infrequent basis) is either:
    - Less than statutory in the case of an un-posted bridge, or
    - Less than the bridge's current posting in the case of a posted bridge

Typically, for the sake of uniformity, MassDOT will supply the necessary initial signs. The sign posts will also be provided if funds are available. The Municipality should order the signs through the MassDOT District office.

District Personnel shall determine, with the Municipality, the exact location of At Bridge signs and Advance Warning Signs. Locations of At Bridge signs and Advance Warning signs and date of erection of signs shall be reported to the District Bridge Inspection Unit in order to update the bridge's inventory record.

If posting signs are missing, the DBIE shall request signs to be installed, refer to Attachment 6-22, Letter to Municipalities reporting Missing Posting Signs. Fabrication and erection of missing Posting Signs will be the Municipality's responsibility. The Municipality shall be allowed 30 days from the initial notification of missing signs to replace them.

6.12 FOLLOW UP SITE VISIT PROCEDURES REGARDING INSTALLATION OF POSTING SIGNS

The purpose of this section is to provide a guideline for the necessary actions required to ensure the placement of appropriate signs at bridges when they are required.

6.12.1 MassDOT Owned Structures

Upon receiving a notice that a bridge should be posted, or notification that weight limit signs are missing, the District shall erect the appropriate weight restriction signs in accordance with Section 6.11.1.

Locations of signs, truck detour route, if applicable, and date of erection of signs shall be reported to the District Bridge Inspection Engineer to complete the verification process.

Within days 7 days after the deadline set above, the District Bridge Inspection Engineer shall assign someone from his/her section to perform a follow-up sign site visit to assure that all the posting signs are properly

installed. He/She will fill out the Follow-Up Verification of Sign Form, see Attachment 6-23 and submit it to the District Bridge Inspection Engineer for the appropriate action to be implemented.

If the signs are in place no further action will be required. If the signs are not installed or not installed properly then the Follow-Up Verification of Sign Form shall be sent by interoffice memo through the District Highway Director to the MassDOT representative responsible for installation of the signs.

It shall be noted that if posting signs are not installed / or not properly installed, the above procedure shall be repeated until posting signs are properly installed. In the case of no signs installed after the first site visit Item 41 shall be coded "B".

6.12.2 Municipally Owned Structures

Upon receiving a notice that a municipally owned bridge should be posted, or notification that weight limit signs are missing, the Municipality shall erect the appropriate weight restriction signs in accordance with Section 6.11.2. Within days 7 days after the deadline set above, the District Bridge Inspection Engineer shall assign someone from his/her section to perform a follow-up sign site visit to assure that all the posting signs are properly installed. He/She will fill out the Follow-Up Verification of Sign Form, see Attachment 6-23 and submit it to the District Bridge Inspection Engineer for the appropriate action to be implemented.

If the signs are not installed or not installed properly then by letter signed by the District Highway Director (See Attachment 6-24) will be sent to the Municipality for appropriate action.

It shall be noted that if no signs are erected by the municipality, MassDOT, in the opinion of the Chief Counsel, is authorized under the provisions of M.G.L. c 85,§ 35 to post the bridge on its own initiative. For each case of non-compliance, the State Bridge Engineer, in consultation with the Chief Engineer and the District Highway Director, will determine if MassDOT should exercise this right in the interest of public safety.

It shall be noted that if posting signs are not installed / or not properly installed, the above procedure shall be repeated until posting signs are properly installed or MassDOT exercises it's right to post the structure on its own initiative. In the case of no signs are installed after the first site visit Item 41 shall be coded "B".

6.13 CHAPTER 6 ATTACHMENTS

REQUEST FOR BRIDGE RATING/RE-RATING FORM

To be filled out by DBIE:

District: ___ Town:_____ Br. No.:_____ BIN No. _____

Facility Carried: _____I-43/Structure Type (Main):_____ Code:_____

Features Intersected: _____ I-44/Structure Type (Appr.):____ Code:_____

Plans Available (Y / N) Full Set (Y / N) Partial Set (Y / N) Rating (Y / N) Re-Rating (Y / N)

Date of Last Rating: _____ Previous Rating Book Available in District (Y / N)

Reason for Rating Request:

☐ Deck Explain:
☐ Superstructure Explain:
☐ Substructure Explain:
☐ Never been Rated before
☐ New/Rehabed Bridge New Date of Item 27:_____ New date of Item 106:_____
☐ Previous Rating was based on Engineering Judgment without calculations Date of rating: _____

Priority: ☐ High ☐ Medium ☐ Low

Remarks & Comments:

DBIE's Signature: _____ Date of Submission to ABIE:_____
Please attach a copy of the Latest SIA, Routine, Special member & Dive Report

To be filled out by the Area Engineer:

☐ I agree with the above request from the DBIE and the attached submitted documentation by the District is sufficient for Rating purposes
☐ I do not agree with the above request from the DBIE because:

Plans available in Boston: (Y / N) Full Set: (Y / N) Partial Set: (Y / N) VIRTIS File: (Y / N)
Previous Rating Report is available in Boston Office: (Y / N) Date of Rating:_____
This structure is designed by: In-House: (Y/N) Consultant: (Y/N) Project # :_____ Consultant Firm:_____

Remarks & Comments:

ABIE's Signature Date of Submission to BIE

To Be Filled out by Bridge Inspection Engineer

☐ Assign to Consultant
☐ Recommend to be assigned to In-House R&O unit
☐ Part of Design Consultant contract, Design Firm:_____
☐ Do not assign, because:
☐ Return it to the District because:

Bridge Inspection Engineer's Signature : Date of Submission to State Bridge Engineer

To Be Filled out by State Bridge Engineer

☐ Assign to Consultant
☐ Assign to In-House R&O unit
☐ Part of Design Consultant contract, Design Firm:_____
☐ Do not assign, because:

State Bridge Engineer's Signature: Date of Submission to Bridge Inspection Engineer

To Be Filled out by Bridge Inspection Engineer

☐ Assign to In-House R&O Unit Date:
☐ Assign to Consultant Date: Consultant: Contract No. & Assignment No.

Remarks:

Attachment 6-1: Request for Bridge Rating/Re-Rating Form

10 YEAR RATING EVALUATION FORM

To be filled out by DBIE:

This Evaluation Date:_____

District: ___ City/Town:_____ Br. No.:_____ BIN No. _____

Structure No. _____ I-22 (Owner) : _____

Facility Carried: _____I-43/Structure Type (Main):_____ Code:_____

Features Intersected: _____I-26 Year Built:_____ I-106 (Year Rebuilt):_____

Condition Rating from the latest Inspection Report:

Inspection date	I-58	I-59	I-60	I-62

Prior Rating Information

Rating Dates	I-58	I-59	I-60	I-62	Inventory Rating Values				Operating Rating Values			
					H20	Type 3	3S2	Hs20	H20	Type 3	3S2	HS20

This 10 year Evaluation recommends this structure be:

☐ Rated, with the following Priority

☐ High ☐ Medium ☐ Low

Reason:

☐ No Rating Needed

Reason:

DBIE's Signature Date of Submission to ABIE to insert into Boston History File

Attachment 6-2: 10 Year Rating Evaluation Form

THE COMMONWEALTH OF MASSACHUSETTS
MASSDOT - HIGHWAY DIVISION
INTEROFFICE MEMORANDUM

TO: NBIS File

FROM: Alexander K. Bardow, P.E., Director of Bridges & Structures

DATE: October 5, 2012

RE: BRIDGE RATING
BLACKSTONE
BRIDGE STREET OVER BLACKSTONE RIVER
BRIDGE NO. B-13-001 (1EA)
STRUCTURE NO. B13001-1EA-MUN-NBI
BIN = 1EA

Based on the review of the Bridge Rating Report prepared by Lamson Engineering Corp., on behalf of WSP-SELLS, dated August 2012, it is recommended that Bridge No. B-13-001 (1EA) **BE POSTED FOR:**

TWO AXLE	**(H20)**	**20 TONS**
THREE AXLE	**(3)**	**25 TONS**
FIVE AXLE	**(3S2)**	**30 TONS**

The controlling elements of the structure for both the inventory and operating stress level requirement are the interior beams no. 3 to 7, and 11 to 15, at 0.50 L for flexural strength, for all posting vehicles. The inventory stress level rating values, in tons, were calculated be to be 18.6, 20.3, and 25.3 and the operating stress level rating values, in tons, were calculated to be 42.9, 47.0 and 58.6 for the H20, Type 3 and Type 3S2 vehicles, respectively. The above recommended posting is based on an allowable overstress of 7.0 % per Bridge Inspection Handbook Directive 3.2.1, Section 4.1.2 (1). Prior to this rating report, this structure was last rated in May, 1983.

Overall, the structure is in fair condition. This two spans simply supported structure was built in 1955. The superstructure consists of rolled steel beams with a composite concrete deck and bituminous concrete wearing surface. The substructure consists of two cantilever concrete abutments, wingwalls, and a solid reinforced concrete pier.

The following is recommended to improve and maintain the condition of the structure.

- Remove additional pavement on top of the deck to improve the rating values.
- Clean and paint the structural steel.
- Repair the deteriorated web and bottom flange of beam 2 in span 1 near north expansion bearing. Clean and repair rusting areas at ends of all beams over the pier.
- Repair longitudinal cracks and spalling to the underside of the concrete deck slab.
- Replace existing bent steel keeper angle over the pier.
- Replace the existing non-standard bridge rail with Type S3-TL4 bridge rail.

(Continued)

Attachment 6-3: IOM to NBIS File, page 1 of 2

NBIS FILE
October 5, 2012
PAGE 2 of 2
RE: B-13-001 (1EA) RATING REPORT

- Remove the existing approach guardrail and replace with a new system that conforms to current standards, including attachment to the bridge.
- Repair all cracked and spalled concrete to the pier, abutments, and wingwalls.

- General maintenance and inspections should continue at regularly scheduled intervals to ensure the structural adequacy and performance of this bridge.

It is recommended that this structure be placed in a program for rehabilitation or replacement.

The Ratings and Overloads Unit shall enter the following load rating data into the 4D Database upon receipt of a signed copy of this memorandum:

Item 63 = 1 (Load Factor Method)
Item 65 = 1 (Load Factor Method)
INV H20 = 18.6 English Tons
INV Type 3 = 20.3 English Tons
INV Type 3S2 = 25.3 English Tons
INV HS20 = 21.1 English Tons
Rating Report = Y
Computer File = Y

Item 64 = 68.9Metric Tons
Item 66 = 41.2Metric Tons
OPR H20 = 42.9 English Tons
OPR Type 3 = 47.0 English Tons
OPR Type 3S2 = 58.6English Tons
OPR HS20 = 48.8 English Tons
Date of Last Rating Report = 08/2012
Computer File Type = VIRTIS

HRB/hn

cc: Rating Reports (Bridge and District copies)
Attach: 08/2012 Rating Report Summary Sheet & Breakdown Sheet

Attachment 6-3: IOM to NBIS File, page 2 of 2

RED COVER RATING REPORT LOG

Date Rating Received	Bridge No. (BIN)	Consultant	Rec. Page Read by: (Initials/Date)	Action Taken by State Bridge Engineer	Returned from R/O	Final Disposition

Attachment 6-4: Red Cover Rating Report Log

MassDOT Massachusetts Department of Transportation Highway Division

RED COVER RATING REPORT TRACKING FORM

TOWN: _____

BRIDGE NO.: _____ BIN: _____

FACILITY ON BRIDGE: _____

FEATURE INTERSECTED: _____

CONSULTANT: _____

DATE REPORT RECEIVED: _____

STATE BRIDGE ENGINEER'S INITIAL REPORT SCREENING

RECOMMENDATION PAGE READ BY: _____ DATE: _____

ACTION TAKEN BY STATE BRIDGE ENGINEER:

_____

_____

_____

_____

RATINGS/OVERLOAD REVIEW

RATING REPORT RECEIVED BY: _____ DATE: _____

REPORT REVIEW ASSSIGNED TO: _____ DATE: _____

RATINGS/OVERLOAD REVIEW COMMENTS:

_____

_____

_____

_____

_____

DATE REPORT RELEASED FROM RATINGS/OVERLOAD: _____

Attachment 6-5: Red Cover Rating Tracking Form

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
INTEROFFICE MEMORANDUM

TO: Mary-Joe Perry, District 5 Highway Director

ATTN: Daniel S. Crovo, P.E., District Bridge Engineer

FROM: Alexander K. Bardow, P.E., State Bridge Engineer

DATE: August 13, 2013

RE: **National Bridge Inspection Standards (NBIS)**
Bridge Rating and Posting

New Bedford: I 195 / ST140
BRIDGE NO: N-06-014
BIN NO: 71F
STRUCTURE NO: N06014-71F-DOT-NBI

Based upon the Bridge Rating prepared by GPI Engineers, Inc., dated June 1, 2013 (copy filed with the District Bridge Inspection Unit) there is **NO POSTING** required for this bridge.

Please be advised that some deficiencies were reported in the rating report with recommendations to be addressed through repairs or rehabilitation (please see attached memo by the State Bridge Engineer to NBIS file dated July 26, 2013).

The District Bridge Inspection Unit will code all related items in the inventory appropriately and submit changes with their monthly compliance report.

BJS/bjs
cc: BIE (3)
DBIE, D-5

Enclosure: State Bridge Engineer's letter to NBIS file dated July 26, 2013

Attachment 6-6: IOM to DHD No Posting State Owned Structure

HIST. FILE

Deval L. Patrick, Governor
Richard A. Davey, Secretary & CEO
Frank DePaola, Administrator

MassDOT Massachusetts Department of Transportation Highway Division

October 24, 2013

Town of Mansfield
Board of Selectmen
6 Park Row
Mansfield, MA 02048

Attn: Richard Alves, P.E., Town Engineer

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE RATING AND POSTING

Mansfield: ST106 EAST ST / CANOE RIVER
Bridge No: M-03-012
BIN No: AQ4
Structure No: M03012-AQ4-MUN-NBI

Dear Select Board:

The Massachusetts Department of Transportation (MassDOT) - Highway Division has undertaken the inventory, inspection, and rating of municipal bridges to assist the cities and towns in complying with state and federal laws and regulations.

In accordance with the provisions of **M.G.L.C 85, sub-section 35**, the MassDOT - Highway Division has determined the maximum load which the subject bridge may safely carry.

In conformance with that determination by MassDOT - Highway Division, there is **NO POSTING** required for this bridge.

General maintenance and inspections should continue at regular scheduled intervals to ensure the structural adequacy and performance of the structure.

A copy of the Rating Report is filed in the District Bridge Inspection Unit, telephone no. (508) 884-4236. The Department is pleased to assist you in this matter of bridge safety.

Sincerely,

Alexander K. Bardow, P.E.
State Bridge Engineer

BJS/bjs
cc: BIE (2)
DHD, D-5
DBIE, D-5

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Attachment 6-7: Letter to City/Town - No Posting of Municipal Owned Structure

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
INTEROFFICE MEMORANDUM

TO: Jonathan L. Gulliver, District 3 Highway Director

ATTN: Maintenance Engineer

FROM: Alexander K. Bardow, P.E., State Bridge Engineer

DATE: June 24, 2013

RE: **National Bridge Inspection Standards (NBIS)**
Bridge Rating and Posting

Lancaster: JACKSON RD / ST 2
BRIDGE NO: L-02-018
BIN NO: 23U
STRUCTURE NO: L02018-23U-DOT-NBI

A rating report for the subject bridge (copy filed with the District Bridge Inspection Unit) has been completed by MHD Ratings and Overloads Unit, dated May 14, 2013.

In accordance with the Board Action taken, item # 35 dated 6/12/13, this bridge is to be POSTED as follows:

TYPE "H" (2 axles)	**13 TONS**
TYPE "3" (3 axles)	**16 TONS**
TYPE "3S2" (5 axles)	**20 TONS**

Please direct your personnel to post the bridge within 30 working days, provide an alternate route for vehicles exceeding the posted limits and notify the local officials of the action taken.

Please be advised that some deficiencies were reported in the rating report (see attached letter by State Bridge Engineer to NBIS file dated 5/30/13) with recommendations to be addressed through repairs or rehabilitations.

The District Bridge Inspection Unit shall code all related items in the inventory appropriately and submit changes with the monthly compliance report upon verifying that you have complied with this warrant.

GK/gk
cc: BIE (3)
DBIE, D-3
State Police

Attachment: Letter to NBIS file dated 5/30/13

Attachment 6-8: IOM to DHD - Posting State Owned Structure

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
INTEROFFICE MEMORANDUM

TO: Jonathan L. Gulliver, Acting District 3 Highway Director

ATTN: Maintenance Engineer

FROM: Alexander K. Bardow, P.E., Director of Bridges and Structures

DATE: October 22, 2012

RE: **National Bridge Inspection Standards (NBIS)**
Bridge Rating and Posting

Blackstone: BRIDGE ST / BLACKSTONE RIVER
BRIDGE NO: B-13-001
BIN NO: 1EA
STRUCTURE NO: B13001-1EA-MUN-NBI

A rating report for the subject Town owned bridge (copy filed with the District Bridge Inspection Unit) has been completed by WSP SELLS, dated August 1, 2012.

The Town of Blackstone has been directed by the attached letter to post the bridge within 30 days as follows:

TYPE "H" (2 axles)	**20 TONS**
TYPE "3" (3 axles)	**25 TONS**
TYPE "3S2" (5 axles)	**30 TONS**

Please direct your personnel to coordinate with the municipality in posting the bridge, and providing an alternate route for vehicles exceeding the posted limits.

The District Bridge Inspection Unit shall code all related items in the inventory appropriately and submit changes with the monthly compliance report upon verifying that you have complied with this warrant.

GK/gk
cc: BIE (3)
DBIE, D-3
State Police

Attachment: Letter to the Town dated 10/19/12 &
Letter to NBIS file dated 10/5/12

Attachment 6-9: IOM to DHD – Posting of Municipally Owned Structure

MassDOT Massachusetts Department of Transportation Highway Division

October 19, 2012

Town of Blackstone
Town Administrator
15 St. Paul St.
Blackstone, MA 01504

Attn: Michael Supernant, HWY Superintendent

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE RATING AND POSTING
Blackstone: BRIDGE ST / BLACKSTONE RIVER
Bridge No: B-13-001
BIN No: 1EA
Structure No: B13001-1EA-MUN-NBI

Dear Select Board:

The Massachusetts Department of Transportation (MassDOT) - Highway Division has undertaken the inventory, inspection, and rating of municipal bridges to assist the cities and towns in complying with state and federal laws and regulations.

In accordance with the provisions of **M.G.L.C 85, sub-section 35**, the MassDOT - Highway Division has determined the maximum load which the subject bridge may safely carry.

In conformance with that determination by MassDOT - Highway Division, the bridge B-13-001 (noted above) is to be posted for:

TYPE "H" (2 axles)	**20 TONS**
TYPE "3" (3 axles)	**25 TONS**
TYPE "3S2" (5 axles)	**30 TONS**

In reference to posting of the subject bridge, please comply with the following:

1. For the sake of uniformity, the MassDOT - Highway Division will supply the first set of signs. The sign posts will also be provided if funds are available. The signs should be ordered through the MassDOT - Highway Division District 3 office located at 403 Belmont Street, Worcester, MA 01604, telephone no. (508) 929-3800.

2. All Bridge Posting shall be in accordance with **M.G.L.C 85, sub-section 34**.

3. For our NBIS records, notify this office and the District 3 Bridge Inspection Unit of your date of posting and the weight limit posting enforcement official's name, title and office telephone number.

Attachment 6-10: Letter to City/Town - Posting of Municipal Owned Structure, page 1 of 2

Town of Blackstone
Bridge Rating & Posting
Bridge No. B-13-001
October 19, 2012
Page 2 of 2

4. If you have not posted the bridge within thirty (30) days of the date of this letter, please note that under **M.G.L.C 85, sub-section 35**, the MassDOT - Highway Division is authorized to post the bridge on its own initiative.

I draw to your attention that in the past, the Federal Government has suspended Federal Aid to cities and towns that were, in its opinion, not fully implementing the National Bridge Inspection Standards. Failure to properly post and enforce weight load limits is undisputedly a violation and will result in the automatic suspension of funding.

Please be advised that deficiencies were reported in the rating report with recommendations to be addressed through repairs or rehabilitation. The recommendations are as follows:

- Remove additional pavement on top of the deck to improve the rating values.
- Clean and paint the structural steel.
- Repair the deteriorated web and bottom flange of beam 2 in span 1 near north expansion bearing. Clean and repair rusting areas at ends of all beams over the pier.
- Repair longitudinal cracks and spalling to the underside of the concrete deck slab.
- Replace existing bent steel keeper angle over the pier.
- Replace the existing non-standard bridge rail with Type S3-TL4 bridge rail.
- Remove the existing approach guardrail and replace with a new system that conforms to current standards, including attachment to the bridge.
- Repair all cracked and spalled concrete to the pier, abutments, and wingwalls.
- General maintenance should continue at regularly scheduled intervals to ensure the structural adequacy and performance of this bridge.

A copy of the Rating Report is filed in the District Highway Office. The District Highway Director is available to recommend procedures to upgrade the subject bridge.

The Department is pleased to assist you in this matter of bridge safety.

Sincerely,

Alexander K. Bardow, P.E.
Director of Bridges and Structures

GK/gk
cc: BIE (2)
DHD, D-3
DBIE, D-3
State Police

Attachment 6-10: Letter to City/Town - Posting of Municipal Owned Structure, page 2 of 2

THE COMMONWEALTH OF MASSACHUSETTS
MASSACHUSETTS HIGHWAY DEPARTMENT
INTEROFFICE MEMORANDUM

TO: Bernard McCourt, District 5 Highway Director

ATTN: Maintenance Engineer

FROM: Alexander K. Bardow, P.E., Director of Bridges and Structures

DATE: May 7, 2009

RE: **National Bridge Inspection Standards (NBIS)**
Bridge Rating and Posting

Barnstable: US 6 WB/MD CP HWY / ST132 IYANNOUGH RD
BRIDGE NO: B-01-019
BIN NO: 46G
STRUCTURE NO: B01019-46G-MHD-NBI

Based upon the Bridge Rating prepared by MHD Ratings and Overloads Unit, dated February 1, 2007 (copy filed with the District Bridge Inspection Unit), this bridge shall **REMAIN POSTED** as follows:

TYPE "H" (2 axles)	**20 TONS**
TYPE "3" (3 axles)	**25 TONS**
TYPE "3S2" (5 axles)	**40 TONS**

Please direct your personnel to verify that the existing posting signs with the above weight limits are in place and the alternate route for vehicles exceeding the posted limits is being utilized.

Please be advised that some deficiencies were reported in the rating report with recommendations to be addressed through repairs or rehabilitations (please see attached letter by Director of Bridges and Structures to NBIS file dated March 19, 2009).

The District Bridge Inspection Unit will code all related items in the inventory appropriately and submit changes with the monthly compliance report.

BJS/bjs
cc: BIE (3)
DBIE, D-5

Enclosure: Director of Bridges and Structures' letter to NBIS file dated March 19, 2009

Attachment 6-11: IOM to DHD Remain Posted State Owned Structure

DEVAL L. PATRICK, GOVERNOR
TIMOTHY P. MURRAY, LT. GOVERNOR
JEFFREY B. MULLAN, SECRETARY & CEO
LUISA PAIEWONSKY, ADMINISTRATOR

Moving Massachusetts Forward. massDOT Highway

February 3, 2010

Town of Great Barrington
Board of Selectmen
334 Main St.
Great Barrington, MA 01230

Attn: Joseph Sokul, Highway/Facilities Superintendent

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE RATING AND POSTING
Great Barrington: DIVISION ST / HOUSATONIC RIVER
Bridge No: G-11-002
BIN No: 04F
Structure No: G11002-04F-MUN-NBI

Dear Select Board:

The Massachusetts Department of Transportation (MassDOT) - Highway Division has undertaken the inventory, inspection, and rating of municipal bridges to assist the cities and town in complying with state and federal laws and regulations. In accordance with the provisions of **M.G.L.C 85, sub-section 35**, the MassDOT - Highway Division has determined the maximum load which the subject bridge may safely carry.

Based upon the Bridge Rating prepared by Michael Baker Jr., Inc., dated May 2009, it is recommended that this bridge **REMAIN POSTED** for:

TYPE "H" (2 axles)	**15 TONS**
TYPE "3" (3 axles)	**19 TONS**
TYPE "3S2" (5 axles)	**29 TONS**

Please be advised that the following deficiencies were reported in the rating report with recommendations to be addressed through repairs or rehabilitation:

- Removing the existing 2.5" thick bituminous wearing surface and replacing with a 1" thick wearing surface. Reducing the thickness of the current wearing surface would increase the capacity of the structure;
- Repair the spalling in the concrete deck;
- Repair or replace the cracked tie/connection plate at the north truss at U1;

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Attachment 6-12: Letter to City/Town Remain Posted of Municipal Owned Structure, page 1 of 2

Town of Great Barrington
Bridge Rating & Posting
Bridge No. G-11-002
February 3, 2010
Page 2 of 2

- The entire superstructure should be cleaned and painted to arrest active corrosion within the critical stress regions of the floorbeams and stringers and to prevent future corrosion of the remaining components.

A copy of the Rating Report is filed in the District Bridge Inspection Unit, telephone no. (413) 637-5779

The Department is pleased to assist you in this matter of bridge safety.

Sincerely,

Alexander K. Bardow, P.E.
Director of Bridges and Structures

BJS/bjs
cc: BIE (2)
DHD, D-1
DBIE, D-1

Attachment 6-12: Letter to City/Town Remain Posted of Municipal Owned Structure, page 2 of 2

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
INTEROFFICE MEMORANDUM

TO: Mary-Joe Perry, District 5 Highway Director

ATTN: Daniel S. Crovo, P.E., District Bridge Engineer

FROM: Alexander K. Bardow, P.E., State Bridge Engineer

DATE: August 13, 2013

RE: **National Bridge Inspection Standards (NBIS)**
Bridge Rating and Posting

Kingston: ST 3 PILGRIM HWY / JONES RIVER
BRIDGE NO: K-01-011
BIN NO: AGD
STRUCTURE NO: K01011-AGD-DOT-NBI

Based upon the Bridge Rating prepared by AI Engineers, Inc., dated December 1, 2012 (copy filed with the District Bridge Inspection Unit) the posting is **WAIVED** for this bridge.

Please be advised that some deficiencies were reported in the rating report with recommendations to be addressed through repairs or rehabilitation (please see attached memo by the State Bridge Engineer to NBIS file dated July 30, 2013).

The District Bridge Inspection Unit will code all related items in the inventory appropriately and submit changes with their monthly compliance report.

BJS/bjs
cc: BIE (3)
DBIE, D-5

Enclosure: State Bridge Engineer's letter to NBIS file dated July 30, 2013.

Attachment 6-13: IOM to DHD - Waiving the Posting of State Owned Structure

Deval L. Patrick, Governor
Timothy P. Murray, Lt. Governor
Richard A. Davey, Secretary & CEO
Frank DePaola, Administrator

MassDOT Massachusetts Department of Transportation Highway Division

March 18, 2013

City of Lowell
Office of the Mayor
375 Merrimack Street
Lowell, MA 01852

Attn: Lisa DeMeo, City Engineer

SUBJECT NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE RATING AND POSTING
Lowell: SCHOOL ST / NORTHERN CANAL
Bridge No: L-15-022
BIN No: 2BU
Structure No: L15022-2BU-MUN-NBI

Dear Select Board:

The Massachusetts Department of Transportation (MassDOT) - Highway Division has undertaken the inventory, inspection, and rating of municipal bridges to assist the cities and towns in complying with state and federal laws and regulations.

In accordance with the provisions of **M.G.L.C 85, sub-section 35**, the MassDOT - Highway Division has determined that no posting is required for the subject bridge. In conformance with that determination by MassDOT - Highway Division, the posting is **WAIVED** for this bridge.

Please be advised that it is recommended that general maintenance be performed on regular intervals to ensure the structural adequacy and performance of the structure.

A copy of the Rating Report is filed in the District Bridge Inspection Unit, telephone no. (781) 674-2172

The Department is pleased to assist you in this matter of bridge safety.

Sincerely,

Alexander K. Bardow, P.E.
Director of Bridges and Structures

GK/gk
cc: BIE (2)
DHD, D-4
DBIE, D-4

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Attachment 6-14: Letter to City/Town -Waiving the Posting of Municipally Owned Structure

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
INTEROFFICE MEMORANDUM

TO: Jonathan L. Gulliver, District 3 Highway Director

THROUGH: Patricia A. Leavenworth, P.E., Chief Engineer

FROM: Alexander K. Bardow, P.E., State Bridge Engineer

DATE: August 23, 2013

RE: **National Bridge Inspection Standards (NBIS)**
Bridge Rating and Posting

Southborough: BRIDGE ST / CSX
BRIDGE NO: S-20-014
BIN NO: 23L
STRUCTURE NO: S20014-23L-DOT-634

Based upon the Bridge Inspections performed by District 3 Bridge Inspection Personnel, dated August 20, 2013 and August 22, 2013 (copy filed with the District Bridge Inspection Unit) the above bridge was found to be unsafe. It is recommended that this bridge be **CLOSED** to vehicular traffic.

The reason for this recommendation is due to the immanent failure of the stringers supporting the corrugated metal deck pan supporting the bituminous concrete wearing surface.

This letter confirms the notification to closed the bridge per an email on 8/20/13 from Mohammed Nabulsi , District 3 Bridge Engineer to Alexander Bardow, State Bridge Engineer.

The District Bridge Inspection Engineer shall code all related items in the inventory appropriately and submit changes with the monthly compliance report upon verifying that you have complied with the Memorandum.

GK/gk
Attach.: NBIS IOM dated 8/23/13
cc: BIE (3)
DBIE, D-3

Attachment 6-15: IOM to DHD - Close State Owned Structure

Deval L. Patrick, Governor
Timothy P. Murray, Lt. Governor
Richard A. Davey, Secretary & CEO
Frank DePaola, Administrator

MassDOT Massachusetts Department of Transportation Highway Division

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

July 13, 2012

Town of Amherst
Board of Selectmen
Town Hall, 4 Boltwood Ave
Amherst, MA 01002

Attn: Guilford Mooring, Superintendent of Public Works

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE RATING AND POSTING
Amherst: MILL ST / MILL RIVER
Bridge No: A-08-008
BIN No: 0PA
Structure No: A08008-0PA-MUN-NBI

Dear Select Board:

The Massachusetts Department of Transportation (MassDOT) - Highway Division has undertaken the inventory, inspection, and rating of municipal bridges to assist the cities and towns in complying with state and federal laws and regulations. In accordance with the provisions of **M.G.L.C 85, sub-section 35**, the MassDOT - Highway Division has determined the maximum load which the subject bridge may safely carry.

The above bridge was rated, and it is recommended that the bridge be **CLOSED** to vehicular traffic.

The reason for this recommendation is: no load carrying capacity and web buckling in beam 5 due to severe section losses.

This letter confirms the notification to closed the bridge per a telephone conversation on July 12, 2012 between Guilford Mooring, Superintendent of Public Works and Mark Banasieski, District 2 Bridge Engineer.

Your immediate action is requested. Please respond in writing confirming your action not later than July 20, 2012.

A copy of the Rating Report regarding this recommendation is on file at our District Office. Albert R. Stegemann, the District Highway Director, will be pleased to review the report with you and advise you of any programs available regarding this bridge.

Thank you for your cooperation.

Sincerely,

Thomas F Broderick, P.E.
Chief Engineer

BJS/bjs
cc: DHD, D-2 & DBIE, D-2, BIE(3)
Duplicate sent by Regular First Class Mail

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Ten Park Plaza, Suite 4160, Boston, MA 02116
Tel: 617-973-7000, TDD: 617-973-7306
www.mass.gov/massdot

Attachment 6-16: Letter to City/Town - Closure of Municipally Owned Structure

The Commonwealth of Massachusetts
Massachusetts Department of Transportation - Highway Division

MISCELLANEOUS ITEM

Action Requested: Bridge Posting

Type of Contract: _____ **Contract #:** _____

Division: BRIDGES AND STRUCTURES **Project I.D. #:** _____

Project/Location: Lancaster / L-02-018 / JACKSON RD / ST 2

Vendor/Party Name and Address: _____

_____

Account No.: _____ **Federal Aid No.:** _____

Description:
Subject: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE POSTING
BRIDGE NO: L-02-018
STRUCTURE NO: L02018-23U-DOT-NBI

Attached is a copy of an interoffice memorandum between Alexander K. Bardow, P.E., Director of Bridges and Structures and Jonathan Gulliver, Distristrit 3 Highway Director, dated May 30, 2013, containing a recommendation to post the bridge as follows:

TYPE "H" (2 axles)	Loading 13 TONS
TYPE "3" (3 axles)	Loading 16 TONS
TYPE "3S2" (5 axles)	Loading 20 TONS

The recommendation is based on the Damage inspection report dated 5/14/13 and calculations performed by the Bridge Section Ratings and Overload Unit.

I recommend that the Bridge No. L-02-018 be posted for the above listed load limits for the best interest of the Commonwealth and the safety of the traveling public.

Approvals:

Brian B. Clang 6/3/13
Submitted by Brian B. Clang, P.E. **Date**

Thomas F. Broderick 6/10/13
~~Acting~~ Chief Engineer **Date**

Alexander K. Bardow 6/3/13
Director of Bridges and Structures **Date**
Alexander K. Bardow, P.E.

General Counsel 6/10/13 **Date**

N/R
Budget/C.E.P.O. **Date**

Administrator **Date**

Sonya N. Barros 6/12/13
Contracts & Records **Date**

N/R
Secretary/CEO **Date**

Item No.: 35
Date: JUN 12 2013

Attachment 6-17: Miscellaneous Item Form

Report Date: October 24, 2013

State Information

BDEPT#= A01006 Agency Br.No.
Town= Abington
B.I.N= 41C
RANK= 2300 H.I.= 97.5 % FHWA Select List= Y

Identification

(8) Structure Number	A0100641CMUNNBI
(5) Inventory Route	151000000
(2) State Highway Department District	05
(3) County Code 023 (4) Place code	00170
(6) Features Intersected	WATER SHUMATUSCACANT RIV
(7) Facility Carried	HWY CENTRAL ST
(9) Location	.5 MI E OF RTE 18
(11) Kilometerpoint	0000.080
(12) Base Highway Network	N
(13) LRS Inventory Route & Subroute	000000000000
(16) Latitude	42 DEG 06 MIN 51.36 SEC
(17) Longitude	70 DEG 56 MIN 30.92 SEC
(98) Border Bridge State Code	Share %
(99) Border Bridge Structure No. #	

Structure Type and Material

(43) Structure Type Main: Prestressed Concrete Code 501
Slab Jointless bridge type: Not applicable
(44) Structure Type Appr:
Other Code 000
(45) Number of spans in main unit 001
(46) Number of approach spans 0000
(107) Deck Structure Type - Concrete Precast Panels Code 2
(108) Wearing Surface / Protective System:
A) Type of wearing surface - Bituminous Code 6
B) Type of membrane - Built-up Code 1
C) Type of deck protection - None Code 0

Age and Service

(27) Year Built 1956
(106) Year Reconstructed 0000
(42) Type of Service: On - Highway-Ped
Under - Waterway Code 55
(28) Lanes: On Structure 02 Under structure 00
(29) Average Daily Traffic 007700
(30) Year of ADT 2011 (109) Truck ADT 06 %
(19) Bypass, detour length 002 KM

Geometric Data

(48) Length of maximum span 0006.4 M
(49) Structure Length 00007.0 M
(50) Curb or sidewalk: Left 01.5 M Right 01.5 M
(51) Bridge Roadway Width Curb to Curb 009.1 M
(52) Deck Width Out to Out 012.2 M
(32) Approach Roadway Width (w/shoulders) 009.1 M
(33) Bridge Median - No median Code 0
(34) Skew 13 DEG (35) Structure Flared N
(10) Inventory Route MIN Vert Clear 99.99 M
(47) Inventory Route Total Horiz Clear 09.1 M
(53) Min Vert Clear Over Bridge Rdwy 99.99 M
(54) Min Vert Underclear ref N 00.00 M
(55) Min Lat Underclear RT ref N 00.0 M
(56) Min Lat Underclear LT 00.0 M

Navigation Data

(38) Navigation Control - No navigation control on waterway Code 0
(111) Pier Protection Code
(39) Navigation Vertical Clearance 000.0 M
(116) Vert-lift Bridge Nav Min Vert Clear M
(40) Navigation Horizontal Clearance 0000.0 M

Ratings and Overloads Engineer

Area Bridge Inspection Engineer

	Code
(112) NBIS Bridge Length	Y
(104) Highway System	N
(26) Functional Class	17
(100) Defense Highway	0
(101) Parallel Structure	N
(102) Direction of Traffic - 2-way traffic	2
(103) Temporary Structure	N
(105) Federal Lands Highways	0
(110) Designated National Network	N
(20) Toll - On free road	3
(21) Maintain - Town Agency	03
(22) Owner - Town Agency	03
(37) Historical Significance built after 1949 presumed to be not eligi	Z

Condition

	Code
(58) Deck	4
(59) Superstructure	4
(60) Substructure	7
(61) Channel & Channel Protection	7
(62) Culverts	N

Load Rating and Posting

	Code
(31) Design Load - HS 20=MS 18	5
(63) Operating Rating Method - Load Factor (LF)	1
(64) Operating Rating	54.1
(65) Inventory Rating Method - Load Factor (LF)	1
(66) Inventory Rating	50.2
(70) Bridge Posting	5
(41) Structure - Open	A

Appraisal

	Code
(67) Structural Evaluation	4
(68) Deck Geometry	3
(69) Underclearances, vert. and horiz.	N
(71) Waterway adequacy	6
(72) Approach Roadway Alignment	6
(36) Traffic Safety Features	0 0 0 0
(113) Scour Critical Bridges	8

Inspections

(90) Inspection Date 09/25/13 (91) Frequency 12 MO

(92) Critical Feature Inspection:				(93) CFI DATE
(A) Fracture Critical Detail	N	00	MO A)	00/00/00
(B) Underwater Inspection	N	00	MO B)	05/01/90
(C) Other Special Inspection	Y	12	MO C)	09/25/13
(*) Other Inspection ()	N	00	MO *)	03/07/06
(*) Closed Bridge	N	00	MO *)	00/00/00
(*) UW Special Inspection	N	00	MO *)	00/00/00
(*) Damage Inspection			MO *)	00/00/00

Rating Loads

Report Date 07/01/09	H20	Type 3	Type 3S2	Type HS
Operating	37.0	48.0	71.0	60.0
Inventory	34.0	44.0	65.0	56.0

Field Posting

Status LEGAL Posting Date 01/26/10

	2 Axle	3 Axle	5 Axle
Actual			
Recommended			

Missing Signs N

Misc.

Bridge Name
N Anti-missile fence N Acrow Panel N Jointless Bridge
Freeze/Thaw N : Not Applicable

Accessibility (Needed/Used)

N / N	Liftbucket	N / N	Rigging	N / N	Other
N / N	Ladder	N / N	Staging		
N / N	Boat	N / N	Traffic Control		
Y / Y	Wader	N / N	RR Flagperson	Inspection Hours:	008
N / N	Inspector 50	N / N	Police		

Attachment 6-18: SI&A items to be updated by ABIE and R&O Engineer

THE COMMONWEALTH OF MASSACHUSETTS
MASSDOT - HIGHWAY DIVISION
INTEROFFICE MEMORANDUM

TO: NBIS File

FROM: Alexander K. Bardow, P.E., Director of Bridges & Structures

DATE: April 30, 2013

RE: BRIDGE RATING
NORTH READING - READING
ST 28 MAIN STREET OVER IPSWICH RIVER
BRIDGE NO. N-18-008= R-03-003 (2L0)
STRUCTURE NO. N18008-2L0-DOT-NBI
BIN = 2L0

Based upon the rating report prepared by Bayside Engineering, Inc., dated July 2012, it is recommended that 1904 construction of concrete jack arch on west side of the Bridge No. N-18-008 = R-03-003 (2L0) **BE CLOSED TO ALL VEHICULAR AND PEDESTRIAN TRAFFIC.**

The controlling elements of the structure for both the inventory and operating stress level requirements are the jack arch beams 1 to 4 for all posting vehicles. The inventory and operating ratings were calculated to be 0 tons for the H20, Type 3 and Type 3S2 vehicles. Prior to this report, this structure was rated in 1979.

It is further recommended that the remaining portion of Bridge No. N-18-008 = R-03-003 (2L0) **BE POSTED FOR:**

TWO AXLE	**(H20)**	**9 TONS**
THREE AXLE	**(3)**	**12 TONS**
FIVE AXLE	**(3S2)**	**18 TONS**

The controlling element of this portion of the structure for both the inventory and operating stress level requirements is beam 6, in shear, for all posting vehicles. The inventory rating in tons were calculated to be 9.2, 11.6, and 18.1 and the operating rating in tons were calculated to be 22.2, 27.9, and 43.5 for the H20, Type 3 and Type 3S2 vehicles, respectively.

Overall, the structure is in fair condition. The structure, built in 1904 and expanded in 1931, consists of a single span concrete jack arch deck with steel stringers encased in concrete and 3 spans of continuously supported reinforced concrete T beams. The substructure for the 1904 construction consists of two concrete abutments with splayed counterfort U-wingwalls. Four multicolumn reinforced concrete pile bents with pile caps support the 1931 construction.

Continued

Attachment 6-19: NBIS Memorandum Containing Dual Recommendations, Page 1 of 2

BIS FILE
April 30, 2013
PAGE 2 of 2
RE: N-18-008 = R-03-003 (2L0) RATING REPORT

The Ratings and Overloads Unit shall enter the following load rating data into the 4D Database upon receipt of a signed copy of this memorandum:

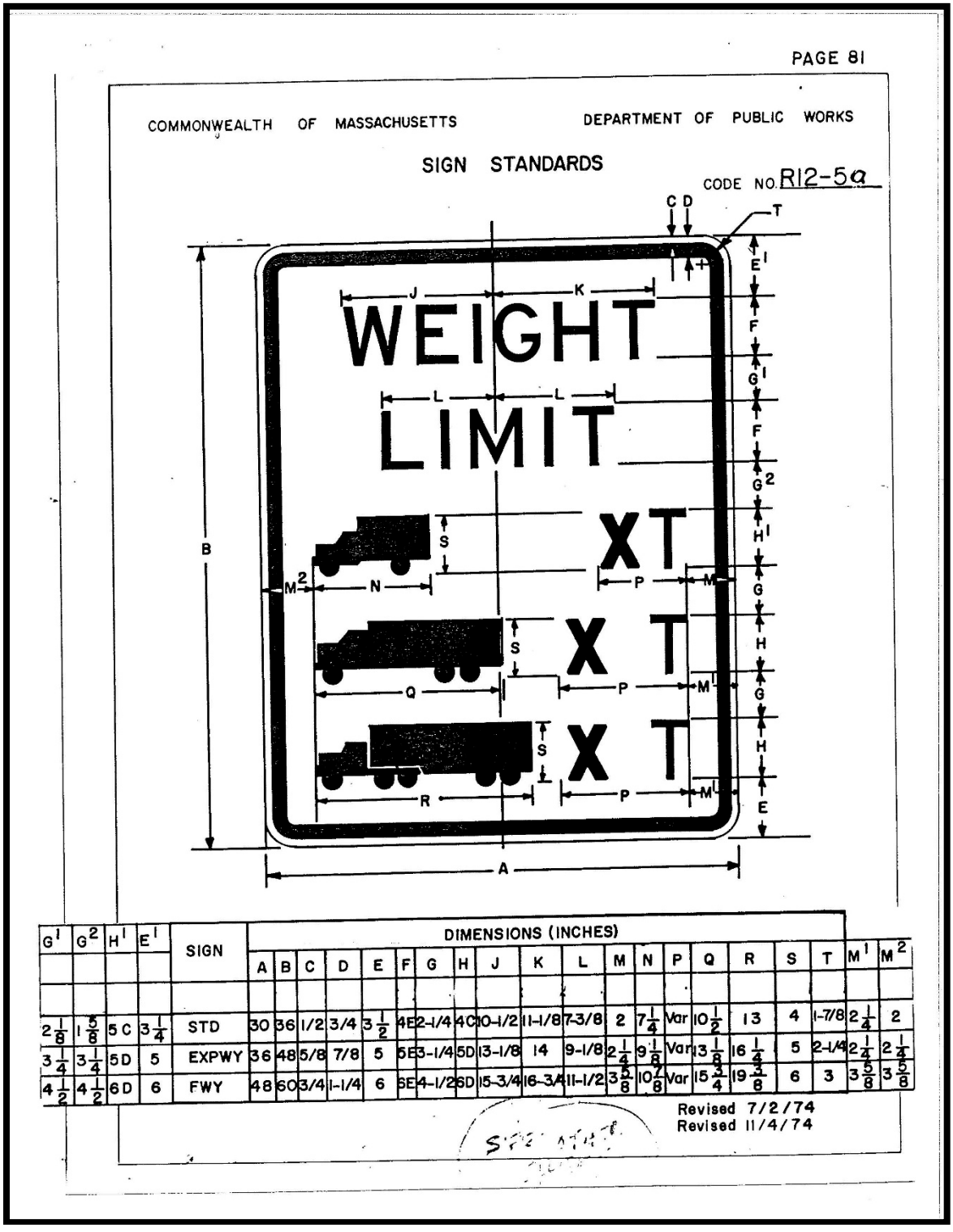
Item 63 = 1 (Load Factor Method)
Item 65 = 1 (Load Factor Method)
INV H20 = 0.0 English Tons
INV Type 3 = 0.0 English Tons
INV Type 3S2 = 0.0 English Tons
INV HS20 = 0.0 English Tons
Rating Report = Y
Computer File = Y

Item 64 = 0.0 Metric Tons
Item 66 = 0.0 Metric Tons
OPR H20 = 0.0 English Tons
OPR Type 3 = 0.0 English Tons
OPR Type 3S2 = 0.0 English Tons
OPR HS20 = 0.0 English Tons
Date of Last Rating Report = 07/12
Computer File Type = VIRTIS

HRB/tn

cc: Rating Reports (Bridge and District copies)
Attach: 07/12 Rating Report Summary Sheet & Breakdown Sheet and skech

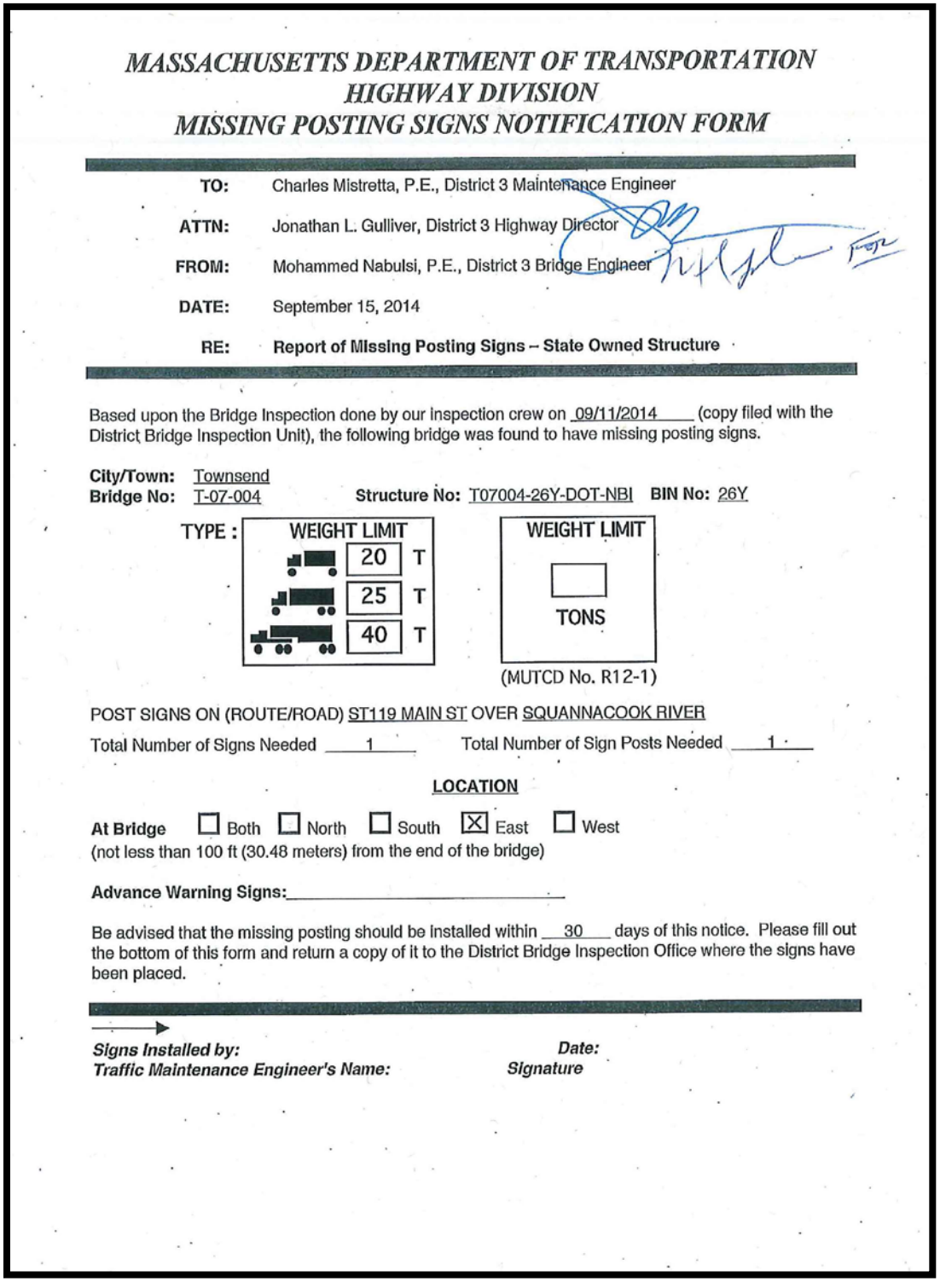
Attachment 6-19: NBIS Memorandum Containing Dual Recommendations, Page 2 of 2



G¹	G²	H¹	E¹	SIGN	DIMENSIONS (INCHES) A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	M¹	M²
2 1/8	1 5/8	5C	3 1/4	STD	30	36	1/2	3/4	3 1/2	4E	2-1/4	4C	10-1/2	11-1/8	7-3/8	2	7 1/4	Var	10 1/2	13	4	1-7/8	2 1/4	2
3 1/4	3 1/4	5D	5	EXPWY	36	48	5/8	7/8	5	6E	3-1/4	5D	13-1/8	14	9-1/8	2 1/4	9 1/8	Var	13 1/8	16 1/4	5	2-1/4	2 1/4	2 1/4
4 1/2	4 1/2	6D	6	FWY	48	60	3/4	1-1/4	6	8E	4-1/2	6D	15-3/4	16-3/4	11-1/2	3 5/8	10 7/8	Var	15 3/4	19 3/8	6	3	3 5/8	3 5/8

Revised 7/2/74
Revised 11/4/74

Attachment 6-20: Posting Sign Standard



MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
MISSING POSTING SIGNS NOTIFICATION FORM

TO: Charles Mistretta, P.E., District 3 Maintenance Engineer

ATTN: Jonathan L. Gulliver, District 3 Highway Director

FROM: Mohammed Nabulsi, P.E., District 3 Bridge Engineer

DATE: September 15, 2014

RE: **Report of Missing Posting Signs – State Owned Structure**

Based upon the Bridge Inspection done by our inspection crew on 09/11/2014 (copy filed with the District Bridge Inspection Unit), the following bridge was found to have missing posting signs.

City/Town: Townsend
Bridge No: T-07-004 **Structure No:** T07004-26Y-DOT-NBI **BIN No:** 26Y

TYPE : WEIGHT LIMIT 20 T 25 T 40 T

WEIGHT LIMIT ☐ TONS

(MUTCD No. R12-1)

POST SIGNS ON (ROUTE/ROAD) ST119 MAIN ST OVER SQUANNACOOK RIVER

Total Number of Signs Needed 1 Total Number of Sign Posts Needed 1

LOCATION

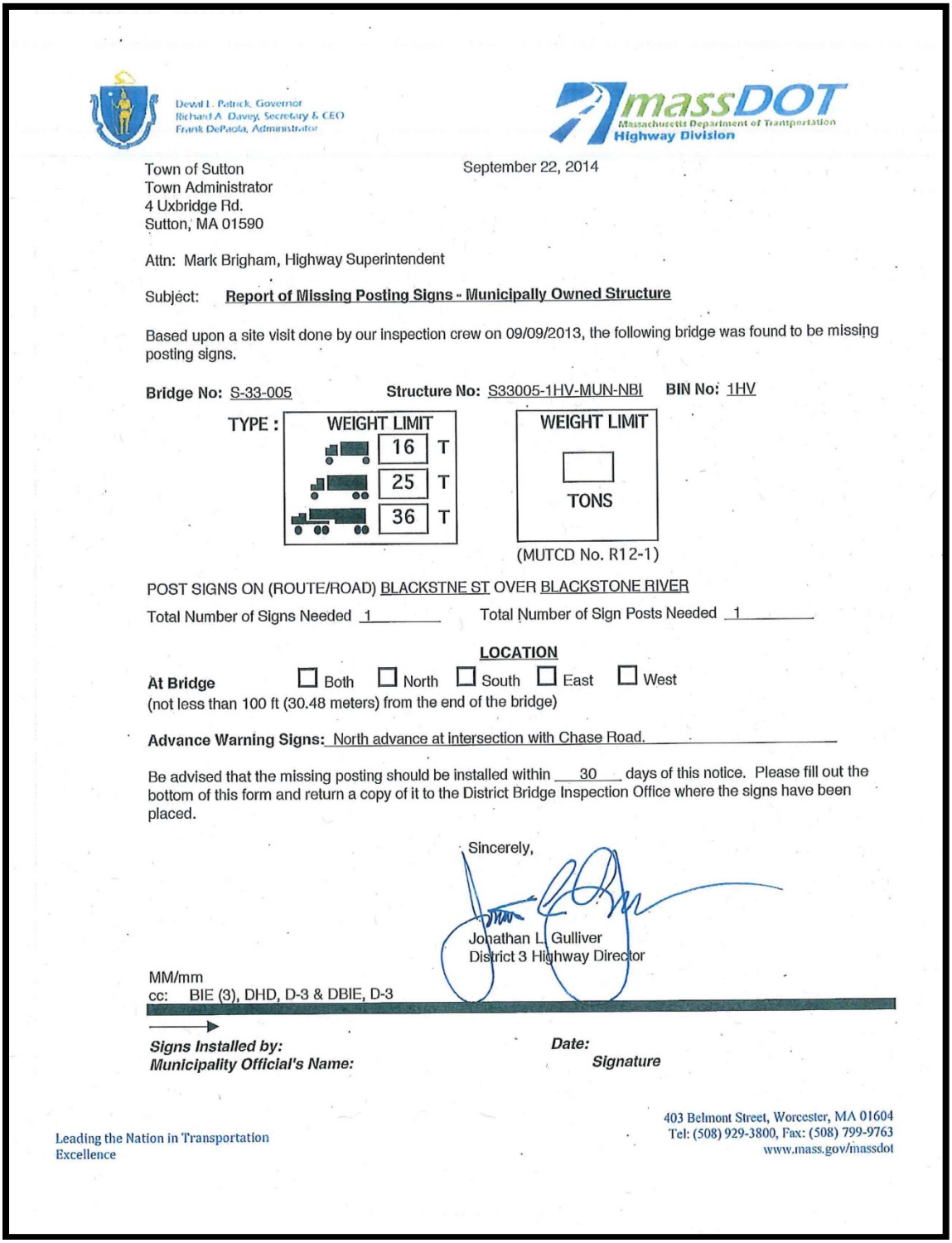
At Bridge ☐ Both ☐ North ☐ South ☒ East ☐ West
(not less than 100 ft (30.48 meters) from the end of the bridge)

Advance Warning Signs:_____

Be advised that the missing posting should be installed within 30 days of this notice. Please fill out the bottom of this form and return a copy of it to the District Bridge Inspection Office where the signs have been placed.

Signs Installed by: ***Date:***
Traffic Maintenance Engineer's Name: ***Signature***

Attachment 6-21: Missing Posting Signs Notification Form – State Owned



Deval L. Patrick, Governor
Richard A. Davey, Secretary & CEO
Frank DePaola, Administrator

MassDOT
Massachusetts Department of Transportation
Highway Division

Town of Sutton
Town Administrator
4 Uxbridge Rd.
Sutton, MA 01590

September 22, 2014

Attn: Mark Brigham, Highway Superintendent

Subject: **Report of Missing Posting Signs - Municipally Owned Structure**

Based upon a site visit done by our inspection crew on 09/09/2013, the following bridge was found to be missing posting signs.

Bridge No: S-33-005 **Structure No:** S33005-1HV-MUN-NBI **BIN No:** 1HV

TYPE :

(MUTCD No. R12-1)

POST SIGNS ON (ROUTE/ROAD) BLACKSTNE ST OVER BLACKSTONE RIVER

Total Number of Signs Needed 1 Total Number of Sign Posts Needed 1

LOCATION

At Bridge ☐ Both ☐ North ☐ South ☐ East ☐ West
(not less than 100 ft (30.48 meters) from the end of the bridge)

Advance Warning Signs: North advance at intersection with Chase Road.

Be advised that the missing posting should be installed within 30 days of this notice. Please fill out the bottom of this form and return a copy of it to the District Bridge Inspection Office where the signs have been placed.

Sincerely,

Jonathan L. Gulliver
District 3 Highway Director

MM/mm
cc: BIE (3), DHD, D-3 & DBIE, D-3

Signs Installed by: ***Date:***
Municipality Official's Name: ***Signature***

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403 Belmont Street, Worcester, MA 01604
Tel: (508) 929-3800, Fax: (508) 799-9763
www.mass.gov/massdot

Attachment 6-22: Letter to Municipalities reporting Missing Posting Signs

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
FOLLOW-UP VERIFICATION OF SIGNS

City/Town: Great Barrington Location: US 7 /ST23/STATE / HOUSATONIC RIVER

Bridge No: G-11-014

Structure No: G11014-09M-DOT-NBI

BIN No: 09M

Date of Initial Recommendation Notice (copy attached): September 26th, 2011

Recommended Posting: 20-25-36

Installed Posting: 20-25-36

Results of the site visit

(x) All signs are properly installed.

( ) Signs are installed, but not properly (please explain):
At Bridge ☐ Both ☐ North ☐ South ☐ East ☐ West
(not less than 100 ft (30.48meters) from the bridge)

Advance Warning Signs (please, give location)

_____

( ) No action has been taken.

Comments: _____

Verified by: Andrew Labib Signature: Andrew Labib

Site visit date: December 9th, 2011 Report date: September 26th, 2011

Reviewed by District Bridge Inspection Engineer: 12/12/11

DBIE's Comments:

Attachments:

Attachment 6-23: Follow Up Verification of Signs

Deval L. Patrick, Governor
Timothy P. Murray, Lt. Governor
Richard A. Davey, Secretary & CEO
Frank DePaola, Administrator

MassDOT Massachusetts Department of Transportation Highway Division

City of Taunton
Mayor of Taunton
15 Summer Street
Taunton, MA 02780

August 10, 2012

Attn: Fred Cornaglia, Director of Public Works

SUBJECT: RESULTS OF THE FOLLOW-UP SIGN SITE VISIT

Taunton: COHANNET ST / MILL RIVER
Bridge No: T-01-014
BIN No: 3K3
Structure No: T01014-3K3-MUN-NBI

Dear Select Board:

In the Follow-Up Site Visit of Signs for the above subject bridge (copy attached), please be advised of the following:

( ) Thank you for your corrective action. No more Follow-Up Site Visit of Signs will be performed at this bridge. Next inspection of this structure will be done on its regular inspection cycle.

( ) No action has been taken in regards to installation of missing signs since last Report of Missing Posting Signs (copy attached). Please be advised that for the safety of the public the Weight Posting signs shall be installed as soon as possible.

(**X**) No action has been taken in regards to installation of signs since the initial recommendation notice (copy attached) Please be advised that in the interest of public safety, the safe load limit must be posted and must be enforced. In the past, the federal government has suspended federal aid to cities and towns which were, in its opinion, not fully implementing the national bridge program.

( ) Signs are installed, but not properly (please refer to the attached report). Please have your Maintenance Crew remedy this situation.

( ) Next Follow-Up Site Visit of Signs for the above subject bridge will be done on ____

Sincerely,

Mary-Joe Perry
District Highway Director

Attachments:
1) Follow-Up Verification of Signs report
2) Initial Recommendation Notice

DAP/sw
cc: DHD, A. Bardow
Enclosure

Leading the Nation in Transportation Excellence

1000 County Street, Taunton, MA 02780
Tel: (508) 824-6633, Fax: (508) 880-6102
www.mass.gov/massdot

Attachment 6-24 Follow-Up Verification of Signs Municipally Owned.

CHAPTER 7
UNDERWATER OPERATIONS TEAM

7.1 INTRODUCTION

This chapter introduces MassDOT's Underwater Operations Team (UOT). The primary function of the Underwater Operations Team is to conduct underwater inspections of all state, city and town bridges where required in accordance with the National Bridge Inspection Standards (NBIS). The Team conducts underwater inspections on a year round basis for structures throughout the Commonwealth of Massachusetts. Additional duties of the Underwater Operations Team includes assistance to state and municipal departments in repairing bridge substructure elements and installing scour countermeasures, assisting in search and recovery efforts, debris removal and other related underwater work associated with bridges.

Underwater inspections and other underwater tasks will be conducted by the Underwater Operations Team for all divisions of the Department of Transportation. Upon written request and when approved by the Chief Engineer, these activities will be conducted for other government agencies. Also, in times of flooding or other emergencies and with the approval of the Chief Engineer, part-time members of the Underwater Operations Team may be temporarily activated to assist in situations on a full time basis.

7.2 ORGANIZATIONAL STRUCTURE

The Underwater Operations Team (UOT) is a self-contained unit within MassDOT's Bridge Inspection Section and the Team reports to the Bridge Inspection Engineer. The UOT is headed by the Underwater Operations Engineer who is responsible in overseeing the operation of the unit on a statewide basis.

The Underwater Operations Engineer oversees two Area Dive Coordinators, an Eastern and a Western Area Dive Coordinator. The Area Dive Coordinators are responsible to schedule and coordinate diving activities in their respective areas.

The UOT also consists of full time divers and part time divers. Full Time Dive Team Members dedicate 100% of their time to the Underwater Operations Team. MassDOT also maintains a roster of part-time divers that are able to participate in a minimum of 20 dives per calendar year. The part time divers are DOT engineers from other departments statewide. They collectively supplement the full time divers on a daily basis. Dive teams shall operate on a statewide basis that shall not be restricted by District Boundaries.

7.3 DIVER CLASSIFICATIONS

MassDOT's Underwater Operations Personnel shall be assigned a diver classification and must maintain certain individual diver requirements. A dive is defined as participation by an individual in one day's diving operation, including participation as a safety diver. The divers shall be classified in one of three groupings. The classifications are as follows:

- Class I Diver - Full time diver

- Class II Diver – 20 dives/year (minimum)
- Class III Diver – Inactive/Reserve

A Class III diver must make a check-out dive with the Underwater Operations Engineer or his designee in order to be upgraded from inactive/reserve status. The check-out dive may be held at a bridge site.

7.4 UNDERWATER INSPECTION DIVER QUALIFICATIONS

All members of the Underwater Operations Team receive various training. Such training includes initial scuba training, NBIS bridge inspection training and various training that is conducted annually. This section outlines these requirements.

7.4.1 Initial Eligibility Requirements for Divers

In order to be initially eligible to participate in the Underwater Operation Team, an individual must meet the following requirements:

1. Candidates must receive approval from their current supervisor to participate in the dive program (minimum 20 dives/year)
2. Be employed by the Department in an engineering title
3. Pass a physical examination
4. Pass the following swim test:
   A. Complete 1 mile non-stop swim in a pool
   B. Swim 20 yards underwater
   C. Survival swim, 10 minutes
   D. Recover weight from 10 feet of water
   E. Swim a short distance with a blacked out mask
5. Complete and pass the MassDOT sponsored Scuba Diver Training program. The program is approximately 100 hours in duration and includes classroom, pool and a minimum of 20 open water dives. It is designed to be very physical and expose the candidate to the wide range of diving environments.
6. Complete an FHWA approved comprehensive bridge inspection training course such as the NHI Safety Inspection of In-Service bridges training

7.4.2 Annual Requirements for Divers

All members of the Underwater Operations Team are also required to receive various training/certification/examinations on a yearly basis as follows:

1. Participate and pass an annual Skill Review Session. The session will include reviewing of basic scuba skills, stressful diving situations and other related training
2. Complete an annual 440 yard non-stop swim (pool)
3. Pass and have a current certification for First Aid, CPR, AED, and Oxygen Management
4. Pass an annual physical examination

7.4.3 Additional NBIS Requirements for Divers

As outlined in Section 7.4.1 above, all underwater bridge inspectors must complete an FHWA approved comprehensive bridge inspection training course. MassDOT also requires that all inspectors receive bridge inspection refresher training at a minimum of five year intervals.

7.5 DIVER SAFETY PRACTICES

Divers may be exposed to hazards that include circulatory risk, respiratory risk, low visibility, hypothermia, and possible injury from falls or submerged debris. Safety of all Dive Team members is paramount in daily activities. As such, Dive Team members must adhere to the following diver safety practices:

1. If a diver does not feel well, has sinus congestion, or ear problems, he or she shall refrain from diving. Under no circumstances should a diver forcibly clear his ears in order to participate in a diving operation.

2. A diver shall terminate the dive if he or she becomes ill, experiences equipment malfunction, or for any reason becomes uncomfortable with the surroundings.

3. Dive flags shall be used on all diving operations where boat traffic is possible.

4. Water entries should be made carefully to avoid being impaled on any object protruding from the bottom.

5. Divers should visually scan each other prior to entering the water.

6. Surface personnel should be aware of the position of the divers in the water at all times.

7. When using a boat, do not operate the motor unless the precise location of all divers is known, and then only when the divers are well clear of the boat.

8. Dives requiring decompression stops are not authorized.

9. Dives in excess of 100 feet **are not** authorized.

10. Ascent rates should be slow and never exceed 30’/minute, unless the diver is making an emergency ascent.

11. All scuba dives will be terminated to allow 500 PSI in the tank when the diver surfaces.

12. The “Buddy System” will be used on all scuba diving operations. However, there are times, when working in heavy current, or with limited visibility, that two divers in the water are more of a hazard to each other than a safety factor. Under these conditions it is acceptable for one diver to work at a time, but extreme vigilance should be exercised by surface personnel. The Buddy must be suited with equipment at the ready and be prepared to assist without delay. A specific dive plan should be prepared and carried out so that the safety diver can monitor diver progress.

13. Divers will wash their scuba equipment after each dive and maintain it in good repair.

14. Divers are responsible to deliver their regulator to the Underwater Operations Engineer for yearly maintenance. Visual and hydro scuba tank inspections will be kept current.

15. Divers are responsible to deliver any faulty scuba equipment to the Underwater Operations Engineer for repair or replacement.

16. A qualified diver will remain on the surface during all diving operations.

17. In the event of a thunder and lightning storm, diving operations shall be halted until the storm passes.

18. All dives into submerged structures when a direct ascent to the surface is not possible shall be made with surface supply diving equipment.

19. During surface supply operations, the dive may be terminated when requested by the diver, or the diver fails to correctly respond to communication or signals from a surface team member, or the diver begins to use the reserve air supply.

7.5.1 Compressed Air Injuries

Due to the nature of the work that the Underwater Operation Team performs, an accident involving the compressed air that the divers must breathe involves a different set of emergency procedures that must be followed.

A. If an accident occurs while a diver is breathing compressed air and an air embolism or decompression sickness is suspected, the diver must be taken to a hyperbaric chamber for treatment as soon as possible.

B. The primary source of information for diving accidents and the national coordinating agency for hyperbaric chamber treatment is the National Divers Alert Network (DAN), located at the Duke University Medical Center in Durham, North Carolina. Their emergency number is 919-684-9111, 24 hours/day (office number for non-emergencies is 1-866-446-2641, 8:30AM to 6:30PM, M-F).

C. The procedure for contacting DAN is:
    1. Out at sea, call the Coast Guard not DAN
    2. If inland, transport diver to the nearest hospital or contact rescue personnel first, then call DAN.
    3. The DAN emergency telephone number is the switchboard for Duke University Medical Center. The operators are not trained in diving medicine. Tell the operator:
        - You are calling DAN
        - You have an emergency, or an urgent problem related to a dive
        - That you must talk to the DAN physician on call
        - Coordinating chamber treatment may take 5-15 minutes or longer

- Give your area code and telephone number and stay on the line
- Do not transport a patient to a hyperbaric chamber unless the staff has been alerted and they are willing and able to accept a patient for treatment

D. Transportation to a hyperbaric chamber or hospital
   - Local ambulance service/fire department
   - United States Coast Guard – Search and Rescue
     427 Commercial St.
     Boston, MA
     617-223-5757 (24 hours)

E. Communication
   1. Call 911 for emergency operator assistance
   2. Call Mass. Dept. of Transportation (HOC) (if unable to reach 911)
      1-800-227-0608, 617-310-4700 or 617-946-3150
   3. Local medical facilities may not be familiar with diving related accidents
      - One diver from the Dive Team should accompany the patient
      - If the emergency room doctor does not voluntarily call DAN, insist that it be done. If necessary, make the call yourself
      - A diver with a compressed air injury would be stabilized with oxygen and intravenous drugs in an emergency room before transport to a hyperbaric chamber. The DAN physician must be informed of the patient's dive profile so he can select the proper treatment and drug regimen

7.6 UNDERWATER BRIDGE INSPECTION

There are three methods used to evaluate underwater elements during bridge inspections:

- Wading inspections
- Self-contained diving (SCUBA)
- Surface supplied air diving

Wading inspections can generally be used when waterways are less than 3 feet in depth and have low velocity water flow. The substructure units and stream bed is typically evaluated using waders and a sounding rod or probe. Above water inspection teams generally perform wading inspections as part of the regular inspections.

The Underwater Operations Team is responsible for all SCUBA and Surface Supply inspections. When underwater inspections are required Item 92 (B) on the SI&A sheet is coded "Y".

7.6.1 Waterway Characteristics That Warrant Dive Inspections

As outlined above, a bridge will be assigned to the Underwater Operations Team for an underwater inspection if the water depth is three feet or greater, or at a lesser depth if site conditions require that a diver be used for a complete inspection of all underwater elements.

Those bridges requiring underwater inspection will be inspected on a regular basis in accordance with National Bridge Inspection Standards.

7.6.2 Inspection Frequency

The National Bridge Inspection Standards require that underwater structural elements be inspected at intervals not to exceed 5 years. That maximum frequency is appropriate for bridges with underwater elements that are in excellent conditions in waterways that are passive. In general there are not many structures that will qualify for this maximum frequency. Situations that would cause one to consider reducing the inspection frequency are structural deterioration, stream bed scour and erosion due to water flow, unknown foundations, susceptible stream bed materials, damage to structural components, etc.

Suggested underwater inspection frequencies are offered below. These are some typical situations that may dictate the frequency. The dive frequency is always at the discretion of the Underwater Operations Engineer.

- **60 Months** - New bridges with substructure elements in excellent conditions and known deep foundations in a benign waterway.
- **48 months** – Bridges with substructure element and stream bed in very good condition.
- **36 Months** – Bridges and stream bed in average condition. The majority of MassDOT's bridges have this U/W inspection frequency.
- **24 Months** - Bridges that have substructure elements that are exhibiting minor deterioration or stream beginning to exhibit scour.
- **12 Months** - Bridges that have substructure elements that are exhibiting advanced deterioration or stream beds that have advanced scour. Such bridges may receive a condition rating for Item 60 of 4 (Poor).
- **6 Months** – Bridges that have substructure elements that are exhibiting serious deterioration or stream beds with advanced scour that may impact substructure stability. Such bridges may receive a condition rating for Item 60 of 3 (Serious).
- **3 Months or less** - Bridges that have substructure elements that are exhibiting critical deterioration or stream beds with advanced scour that impacts substructure stability. Such bridges may receive a condition rating for Item 60 of 2 (Critical) or less.

The underwater inspection frequency is entered on the SI&A sheet under Item 92 (B) as a two digit number.

Special member inspections are usually interim inspections with a reduced frequency. Special member inspections may only include elements that require additional inspection. If an inspection identifies element conditions that may deteriorate prior to the next scheduled routine inspection, a special member inspection will be scheduled for those elements.

See Attachments 7-1 thru 7-3 for examples of routine underwater inspection reports and Attachment 7-4 for an example of an underwater special member inspection.

7.7 CLASSIFICATION OF UNDERWATER BRIDGE INSPECTIONS

Underwater bridge inspections are defined under four different levels of inspection. The levels are defined as follows:

Level I:	A general, visual or tactile inspection of the structure, with minimal cleaning, to determine overall condition and identify any problems (See Attachment 7-1)
Level II:	A detailed inspection with sufficient cleaning and measurements to fully document deficiencies (See Attachment 7-2)
Level III:	A very detailed inspection with extensive cleaning and measurements. Non-destructive test will be performed if necessary
Level IV:	A channel grid sounding is obtained. Level IV inspections are normally utilized for a new bridge to establish a river bed benchmark. Every scour critical bridge should have this level of inspection completed with an update as channel features change over time. (See Attachment 7-3)

7.8 UNDERWATER INSPECTION PROCEDURES

It is the diver's responsibility to provide a complete underwater inspection of the structure they have been assigned to inspect. The inspection may be visual if the water clarity permits, or tactile if the visibility is poor. For most dives, a Level II inspection is completed. A Level II inspection is essentially a site reconnaissance to determine if any problems exist and to estimate their size and scope. This will also give the diver an opportunity to acclimate to the site and learn the location of hazardous debris. If significant problems are found, the level of inspection should be upgraded.

7.8.1 Bridge Data Review and Dive Planning

The divers will review all previous underwater inspection reports and all substructure plans available on the bridge to be inspected. The divers will develop a dive plan for each underwater inspection that will determine the number of divers needed, assign duties to each of the divers participating in the dive, state the access means (boat or shore entry) to accomplish the inspection, review dive procedures and determine entry and exit points for the inspection. If conditions do not allow an inspection at the primary bridge, the dive team will proceed to the secondary preplanned inspection.

A dive plan should include the following:

1. Review previous underwater inspection reports and check for:
   - Dive conditions
   - Traffic setup/police detail required
   - Penetration/low clearance requiring surface supply or other specific equipment
   - Boat or inflatable
   - Tidal conditions requiring an inspection at low tide, high tide, or slack tide
   - Notify State Police Marine Unit or local police, if necessary
   - The Underwater Operations Engineer will notify the BIE prior to an inspection, by any team, at a critical or high profile structure

2. Review the bridge plans, if available, and look for:
   - Footing type, depth, dimensions, etc.
   - Sheeting type and location
   - Scour countermeasures

3. Make visual above water inspection of piers and abutments, before beginning diving operations to:
   - Note any misalignment, settlement, cracks, displacement, etc.
   - Note best location for diver entrance and exit
   - Note boat traffic requiring dive flag(s)
   - Coordinate with bridge operator for bridge openings

7.8.2 Dive Equipment

MassDOT possesses and maintains an extensive amount of general and personal use dive equipment to allow for safe and thorough underwater inspections. Safety of employees and the traveling public is MassDOT's primary concern. Divers are required to ensure that all equipment is maintained in good working order. A partial list of equipment typically used by the Dive Team is as follows:

Unit Equipment:

- Dive Vans
- 19' Boston Whaler
- 24' Privateer
- Surface supply gear
- Communication gear
- Underwater camera
- Underwater video
- Probing rods
- Hammers
- Scrapers
- Rulers & measuring tapes
- Clipboards
- Rope
- Ladder (s)
- Dive flags

Personal Equipment:

- Wet suit
- Dry suit
- Face mask
- Swim fins
- Air tank
- Regulator

- Buoyancy compensator
- Weight belt
- Depth gauge
- Pressure gauge
- Knife

Upon completion of dives and return to the office, all divers must clean and store personal equipment and work together to clean unit equipment. If any equipment should show wear or require replacement, notify the Underwater Operations Engineer.

7.8.3 Dive Inspection Process

7.8.3.1 Dive Master

As mentioned previously, multiple divers are always used. The number of divers will depend on the size and type of inspection required. One diver serves as the Dive Master. The Dive Master directs other team members during the inspection, assigning specific duties. The Dive Master is responsible for the report preparation.

7.8.3.2 References

The typical underwater inspection process is well documented in industry reference materials as noted below. As such it will not be detailed in this manual. For a step by step description of the suggested method of inspecting underwater elements and features please refer to the following documents. Copies are available at the Underwater Operations Office (Dive Shack) and at Bridge Inspection Headquarters.

- FHWA Bridge Inspector's Reference Manual (BIRM) Publication No.FHWA-NHI-03-002
- NHI Couse No 130091 Underwater Bridge Inspection class reference manual. Publication No.FHWA-NHI-10-027

7.8.3.3 Established Water Elevation

During an inspection, divers will establish a location for a "water control shot". A water shot is a measurement from a fixed location on the structure to the top of water at the time of the inspection. Sounding depths can then be converted to stream bed elevations relative to the water shot. This allows relevant comparison of soundings from different inspection cycles. Divers should always utilize the water shot location that has been used for previous dives.

a) Height of water level to a constant and fixed location on the bridge (use judgment) (i.e. bottom of beam, bottom of deck, arch intrados, bottom of bent cap)
b) Soundings taken to waterline are adjusted to the initial water level with a correction factor.

7.8.3.4 Stationing

Consistent stationing shall be used when documenting inspections. Stationing established on previous reports or on bridge plans will be used. Abutments and or piers are labeled left and right when looking downstream. If a flow cannot be determined a compass direction will be used.

7.8.3.5 Sounding Location Determination

Soundings are frequently obtained during underwater inspections. Each dive bridge should have at least a stream bed profile obtained along the upstream and downstream ends of the bridge across the channel. They will be useful in documenting future stream bed changes that may affect the structure. The profiles should be re-taken whenever stream bed changes are suspected, such as after high water events.

Scour Critical Bridges should have soundings taken at each inspection. At a minimum they should be taken along the upstream and downstream ends of the bridge across the channel. For new bridges soundings are frequently obtained in a grid pattern within limits as described below.

When soundings are taken during an inspection the following sounding locations should be considered. The objective is to identify any riverbed scour. Divers should use good judgment for sounding locations based on stream bed features and historic inspection data.

- 10’ intervals along face of exposed footing
- 10’-20’ grid beneath bridge, when practical (initial Level IV inspection)
- Continue upstream and downstream 20’ +/- (use judgment)
- 10’ (or convenient measurement) across channel at upstream or downstream end, or a location of greatest scour or highest footing exposure (Level II inspection)

7.8.3.6 Defect Documentation

Divers will note any defects during an underwater inspection that should include the following:

- Scour
- Exposed footings
- Voids in substructure
- Undermining
- Decay/Section Loss
- Cracks

7.9 REPORT PREPARATION

At the completion of an underwater inspection, a dive report will be prepared by the Dive Master or his designee to detail the results of the inspection. If deficiencies are found, sufficient measurements shall be recorded to fully document the condition. Sketches, including plan, elevation, and sectional views shall be drawn when necessary to fully illustrate any deficiency. Reports will be submitted to the Underwater Operations Engineer in a timely manner.

The following reports are used during underwater inspections.

- Created within 4D
  - Routine Underwater Inspection Report
  - Underwater Special Inspection Report
- Not created in 4D
  - Element Level Inspection Report (formerly Pontis & included in Routine Inspection Reports)
  - Diver Activity Report (See Attachment 7-5)
  - Flood Inspection Report

7.10 CRITICAL DEFECT NOTIFICATION

The Bridge Inspection Engineer should be contacted from the bridge site prior to the report being written when critical defects that may affect the structural integrity of the bridge, or the public's safety, are initially observed (refer to Section 4.7).

7.11 FLOOD INSPECTIONS

- Scour Critical bridges should be a priority
- Part time divers may be activated to full time status
- Use Diver Activity Report for reporting
- Underwater Operations Engineer maintains a daily log of structures inspected, with status
- Submit inspection status report to Bridge Inspection Engineer weekly

7.12 INSPECTION REPORT REVIEW AND DISTRIBUTION

Upon completion of a dive inspection, the following steps shall be done in the underwater report writing and distribution:

1. Dive Master prepares the report and marks it complete in 4D when it is ready for review
2. The report is reviewed electronically within 4D by Underwater Operations Engineer. When acceptable the report is approved with a check mark in 4D
3. The report is then signed by the Dive Master and the Underwater Operations Engineer
4. Copies of the report are made and distributed as follows:

   A. Internal Distribution
      - One Copy to the Bridge Inspection Engineer for the NBIS file
      - Original report in the Dive Files located in Boston
      - Two Copies are filed in Westwood

   B. Distribution of Municipally Owned structures
      - One copy to Municipality via letter of transmittal signed by the State Bridge Engineer (see Attachment 7-6)
      - A copy of the letter of transmittal is filed in the NBIS file

C. Distribution of MassDOT owned structures
- Reports are periodically forwarded to the district DHD's with a letter of transmittal signed by the State Bridge Engineer (see Attachment 7-7)
- A copy of the transmittal is filed in the Dive report file in the respective district correspondence folder

7.13 UNDERWATER ELEMENTS

The following are guidelines for areas of concern during underwater inspections.

7.13.1 Footing or Foundations

- Type
  - Spread
  - Pile supported
- Material
  - Concrete
  - Timber cribbing
  - Stone masonry
- Condition
  - Timber
    - Decay
    - Marine borer attack
  - Concrete
    - Deterioration
    - Cracking (location and size)
  - Stone Masonry
    - Check for missing stones
    - Measure depth of penetration between stones if mortar is missing
    - Check for significant cracks
    - Check for misalignment or displacement
    - Check for signs of settlement
- Exposed dimensions
  - Location (stations)
  - Exposed length
  - Exposed height
  - Offset from abutment or pier stem (toe)
- Covered footing
  - Probe, dig, etc. to determine the bottom of footing

7.13.2 Scour

- Indicate location and depth
- Define limits with soundings
- Soil deposition
  - Location
  - Height
- Elevation of water during flooding noted by:

- Discoloration of concrete
- Debris deposited on bridge seats

7.13.3 Undermining

- Dimensions (L x H x Pen.)
- Location

7.13.4 Sheeting

- Type
  - Steel
  - Timber
- Condition
- Height of exposure above footing or mudline
- Thickness
- Measure one section of sheeting to determine size and shape
- Measure offset from abutment or pierwall
- Measure any separation from footing

7.13.5 Piles

- Type
  - Vertical
  - Battered
- Material
  - Timber
  - Concrete
  - Steel (concrete filled)
- Condition
  - Timber piles
    - Inspect for marine borer activity
    - Inspect bolt connections for corrosion
    - Probe wood to detect decay
    - Take caliper measurement to document section loss
    - Inspect for other deterioration, delamination
    - Locate and measure size of any splits or checks
    - Core a sample of wood pile (if necessary)
  - Concrete piles
    - Determine condition of concrete
    - Measure cross-sectional loss
    - Check for erosion of concrete and spalls
    - Check condition of any protective jackets
    - Check for exposed reinforcement
    - Check for cracks
    - Inspect for abrasion or delamination

- Steel piles
  - Check for collision damage
  - Measure cross-section loss
  - Inspect for deterioration
  - Inspect the condition of any protective jackets
- Collision Damage
  - Inspect for broken piles
  - Inspect for missing piles
  - Inspect for cracks and splits
  - Inspect channel bottom for indication of movement
- Spacing (center to center)

7.13.6 Pile Bents

- Condition
  - Piles
  - Bracing
    - Horizontal bracing
    - Diagonal bracing
  - Fasteners
  - Impact damage
  - Missing piles

7.13.7 Fender System

Inspect for material defects and collision damage on the following elements (see inspection procedures for bents):

- Piles
- Diagonal bracing
- Horizontal bracing
- Fasteners
- Wales
- Ladders

7.13.8 Scour Countermeasures

- Type
  - Riprap
  - Dumped stone
  - Cement/grout bags, sand bags
  - Other
- Location
- Condition
- Size (dimensions)

7.13.9 Previous Underwater Repairs

- Type

- Location
- Condition

7.13.10 Soil – Bottom Material

- Visual classification
- Location
- Depth
    - Probe with steel bar or rod

7.13.11 Marine Growth

- Type
- Location
- Thickness

7.13.12 Debris

- Determine amount, type and location
- Estimate reduction of waterway opening
- Note hazards to divers

7.13.13 Photographs

- Visibility, camera availability, and dive conditions permitting (if helpful)

7.13.14 Sketches

- Plan view
- Elevation (if helpful)
- Section (if helpful)

7.14 CHAPTER 7 ATTACHMENTS

MASSACHUSETTS HIGHWAY DEPARTMENT PAGE 1 OF 2

UNDERWATER OPERATIONS TEAM

DIVERS ACTIVITY REPORT

2-DIST	B.I.N.	BR. DEPT. NO.
5	45G	B-17-017

CITY/TOWN	8-STRUCTURE NO.	LEVEL OF INSP.	INSPECTION DATE
BOURNE-WAREHAM	B17017-45G-DOT-NBI	I	11/6/12
7-FACILITY CARRIED	**ACCESS TO BRIDGE**	**UNDERWATER OPERATIONS ENGINEER**	
US 6/ST 28	BOAT	RANDI E. BONICA Randi E. Bonica	
6-FEATURES INTERSECTED	**DEPTH** / **VISIBILITY**	**TEAM LEADER (DIVE MASTER)**	**REPORT SUBMITTED BY:**
COHASSET NARROWS	10' / 15'	CARRIE LAVALLEE	Carrie Lavallee
BOTTOM CONDITION	**CURRENT**	**TEAM MEMBERS**	
CONC. DEBRIS & GRAVEL	TIDAL	R. BONICA, W. COLLERAN, G. BROZ & B. FITZGERALD	

REMARKS

General:
At the request of Kevin Morrissey, District 5 Resident Engineer, the MassDOT Underwater Operations Dive Team conducted a bottom search to locate any debris remaining from the removed sections of Pier #1, Pier #2, Pier #3, and Pier #4. Piers are numbered left to right when facing downstream.

Observations:
The divers noted only smaller pieces of concrete at the mudline at Pier #1. The smaller pieces were 1' to 2' diameter. The divers noted many large and small pieces of concrete at the mudline at Pier #2, Pier #3, and Pier #4. The smaller pieces were 1' to 2' diameter and the larger pieces were 3' to 4' diameter.

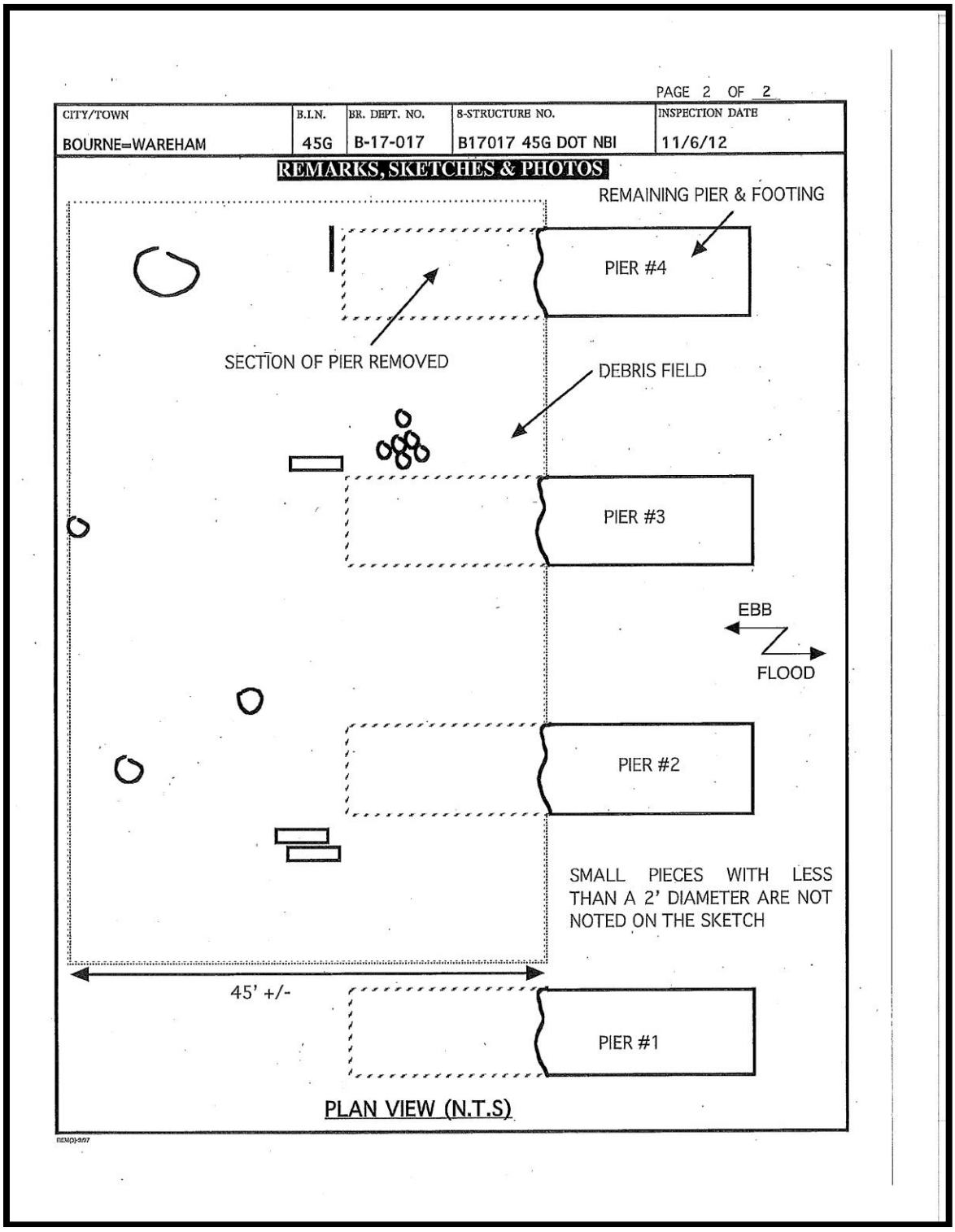
Pier #2:
At 30' downstream from the remaining pier section a 4' diameter stone was noted. At 20' downstream from the remaining pier section and 30' to the right, a 3' diameter stone was noted. In line with the remaining pier section and 5' to the left, two granite blocks with a height of 2', a width of 1.5' and a length of 6' were noted.

Pier #3:
At 45' downstream from the remaining pier section a 3' diameter piece of concrete was noted. In line with the remaining pier section and 5' to the right, a granite block with a height of 2', a width of 1.5' and a length of 4' was noted. At 3' upstream from the remaining pier section a group of 6 concrete pieces with 2.5' diameters were noted.

Pier #4:
In line with the remaining pier section, two pieces of timber sheeting with a height of 5' were noted. In line with the remaining pier section, a 10' diameter mound of concrete debris with a height of 4' was noted. This mound was between the remaining pier section and the new steel sheeting.

DIVEPI(02)-498

Attachment 7-1: Level I Divers Activity Report, Page 1 of 2



Attachment 7-1: Level I Divers Activity Report, Page 2 of 2

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION PAGE 1 OF 6

UNDERWATER OPERATIONS TEAM
ROUTINE UNDERWATER INSPECTION REPORT

2-DIST	B.I.N.	BR. DEPT. NO.
05	45K	W-06-016

CITY/TOWN	8-STRUCTURE NO.	LEVEL OF INSPECTION	93B-DATE INSPECTED
WAREHAM	W06016-45K-DOT-NBI	II	DEC 11, 2012

07-FACILITY CARRIED	ACCESS TO BRIDGE	UNDERWATER OPERATIONS ENGINEER
US 6 MARION RD	EMBANKMENT	RANDI E. BONICA Randi E. Bonica

06-FEATURES INTERSECTED	DEPTH	VISIBILITY	TEAM LEADER (DIVE MASTER)	Report submitted by:
WATER WEWEANTIC RIVER	9 m	0.5 m	RANDI E. BONICA	R. Bonica

BOTTOM CONDITION	CURRENT	TEAM MEMBERS
GRAVEL, BOULDERS	TIDAL/SWIFT	W. J. COLLERAN, B. FITZGERALD, E. P. TERNOSKY

ITEM 60 *SUBSTRUCTURE* — 4

		DEF
1. Abutments	N	
a. Pedestals	N	-
b. Bridge Seats	N	-
c. Backwalls	N	-
d. Breastwalls	N	-
e. Wingwalls	N	-
f. Slope Paving/Rip-Rap	N	-
g. Pointing	N	-
h. Footings	N	-
i. Piles	N	-
j. Scour	N	-
k. Settlement	N	-
l.	N	-
2. Piers or Bents	4	
a. Pedestals	N	-
b. Caps	N	-
c. Columns	N	-
d. Stems/Webs/Pierwalls	5	M-P
e. Pointing	5	M-P
f. Footing	5	M-P
g. Piles	H	-
h. Scour	4	S-P
i. Settlement	7	-
j.	N	-
k.	N	-
3. Pile Bents	N	
a. Pile Caps	N	-
b. Piles	N	-
c. Diagonal Bracing	N	-
d. Horizontal Bracing	N	-
e. Fasteners	N	-
UNDERMINING (Y/N)		Y

ITEM 61 *CHANNEL & CHANNEL PROTECTION* — 4

		DEF
1. Channel Scour	4	S-P
2. Embankment Erosion	7	-
3. Debris	7	-
4. Vegetation	7	-
5. Utilities	X	-
6. Rip-Rap/Slope Protection	7	-
7. Aggradation	7	-
8. Fender System	N	-
a. Piles	N	-
b. Diagonal Bracing	N	-
c. Horizontal Bracing	N	-
d. Wales	N	-
e. Fasteners	N	-
f. Ladders	N	-
9.	N	-

ITEM 59 *SUPERSTRUCTURE*

		DEF
	N	-
	N	-
	N	-

ITEM 62 *CULVERTS* — N

		DEF
1. Roof	N	-
2. Floor	N	-
3. Walls	N	-
4. Headwall	N	-
5. Wingwall	N	-
6. Pipe	N	-
7. Protective Coating	N	-
8. Embankment	N	-
9. Wearing Surface	N	-
10. Railing	N	-
11. Sidewalks	N	-
12. Utilities	N	-
13. Member Alignment	N	-
14. Deformation	N	-
15. Scour	N	-
16. Settlement	N	-
17.	N	-
18.	N	-
UNDERMINING (Y/N)		N

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency- Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor scouring, etc.

S= Severe/Major Deficiency- Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroding rebars, Deteriorated timber piles, Considerable settlement, Considerable scouring or undermining, etc.

C-S= Critical Structural Deficiency- A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency- A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Any part of piles or fender system which are projecting outward and may become a safety hazard for the navigational traffic, etc.

URGENCY OF REPAIR:

I=Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her.]

A=ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the responsible party (if not a State owned bridge) upon receipt of the Inspection Report.]

P=Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available.]

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

DIVE-P1(V3)-4/98

Attachment 7-2: Level II Underwater Inspection Report, Page 1 of 7

PAGE 2 OF 6

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
WAREHAM	45K	W-06-016	W06016-45K-DOT-NBI	DEC 11, 2012

REMARKS

GENERAL REMARKS

This structure is a three span bridge dated 1956. When the bridge was widened new piers were added at the downstream end of the existing piers. The footings for the two sections of pier do not have any space between them. The new and the old sections of each pier are both founded on piles. The two sections of pier have a common concrete pier cap. See attached sketch on Page 5. Both piers have granite facing in the tidal zone. Both abutments are in the dry at low tide and were not inspected for this report.
1) Orientation - Abutments and piers are labeled left and right when facing downstream.
2) Sta 1+00 is at the upstream face of the new section of the pier. See sketch on Page 5.

Note: Tides are approximately 1/2 hour after tides at Marion, Sippican Harbor. Bridge is best inspected at slack tide.

ITEM 60 - SUBSTRUCTURE

Item 60.2 - Piers or Bents
Item 60.2.d - Stems/Webs/Pierwalls
Left Pier:
There are random areas of minor concrete deterioration on the right side of the pier, just above the footing. The largest area measures: 1.0' L x 0.7' H x 1.7' P. The deterioration is into an area of concrete laitance. There are random cracked blocks in the upper tidal zone.

Right Pier:
The old pier has minor concrete deterioration with laitance at the bottom of the concrete pierwall, just above the tremie. The pier from the nose to the angle points is approximately 4'.
Right Side - Deterioration is from the upstream nose, to the angle point, and continues downstream an additional 5' from the angle point. Maximum height is 1.0' and maximum penetration is 0.4'.
There are minor remnants of timber formwork against the right face of the old section of the pier.
Left Side - There is deterioration from the upstream nose to the angle point. Maximum height is 1.0' and maximum penetration is 0.3'.

Item 60.2.e - Pointing
Left Pier:
There is minor pointing loss in the tidal zone but the joints are generally tight. Maximum penetration in the right side is 3'+ and maximum penetration in the left side is 2.0'.

Right Pier:
There is minor pointing loss in the tidal zone but the joints are generally tight. Maximum joint penetration in the right side is 1.7', left side is 1.3', and 3.0'+ at the upstream and downstream noses.

Item 60.2.f - Footing
Left Pier:
The left face of the old section has steel sheeting intermittently exposed 2.0' to 2.6' off the pier with a maximum height of exposure of 4.0'.
There is steel sheeting which is cut off at the top of the footing at the new section of pier. The maximum exposed height along the downstream nose is 16.9'.

Undermining:
At the downstream end of the right face of the old section and continuing into the new section there is a void at the mudline. For measuring purposes Sta 1+00 is at the upstream face of the new section of the pier. The void extends approximately 3.0' downstream of Sta 1+00 where it meets steel sheeting. The void extends approximately 11' upstream of Sta 1+00 where it is covered by boulders. The maximum height of the void is 1.2' and the maximum penetration is 12.7'. The width of the footing is approximately 9', so the undermining goes completely under the footing and beneath the mudline on the left side of the pier. See Void Monitoring Chart on Page 6.

REM.(2)7-86

Attachment 7-2: Level II Underwater Inspection Report, Page 2 of 7

PAGE 3 OF 6

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
WAREHAM	45K	W-06-016	W06016-45K-DOT-NBI	DEC 11, 2012

REMARKS

Item 60.2.f - Footing (Cont'd)

This undermining may have been caused by a washout of concrete laitance in addition to a scouring out of bottom materials.

Right Pier:
The sheeting at the new section of the pier is cut off at the top of the footing. The exposed height along the downstream nose is 14.2'.
Right Side - There is deterioration at the mudline starting 10.0' upstream of the downstream nose of the old pier (10' L x 1.0' H x 1.3' P).
Left Side - There is deterioration at the mudline from the downstream angle point to the downstream nose of the old pier (4.0' L x 0.6' H x 0.6' P).

Item 60.2.h - Scour
Left Pier:
The left face of the old section has steel sheeting intermittently exposed 2.0' to 2.6' off the pier with a maximum height of exposure of 4.0'.
There is steel sheeting which is cut off at the top of the footing at the new section of pier. The maximum exposed height along the downstream nose is 16.9'.

Undermining:
At the downstream end of the right face of the old section and continuing into the new section there is a void at the mudline. For measuring purposes Sta 1+00 is at the upstream face of the new section of the pier. The void extends approximately 3.0' downstream of Sta 1+00 where it meets steel sheeting. The void extends approximately 11' upstream of Sta 1+00 where it is covered by boulders. The maximum height of the void is 1.2' and the maximum penetration is 12.7'. The width of the footing is approximately 9', so the undermining goes completely under the footing and beneath the mudline on the left side of the pier. See Void Monitoring Chart on Page 6.
This undermining may have been caused by a washout of concrete laitance in addition to a scouring out of bottom materials.

Right Pier:
The sheeting at the new section of the pier is cut off at the top of the footing. The exposed height at the downstream nose is 14.2'.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.1 - Channel Scour
Left Pier:
The left face of the old section has steel sheeting intermittently exposed 2.0' to 2.6' off the pier with a maximum height of exposure of 4.0'.
There is steel sheeting which is cut off at the top of the footing at the new section of pier. The maximum exposed height along the downstream nose is 16.9'.

Undermining:
At the downstream end of the right face of the old section and continuing into the new section there is a void at the mudline. For measuring purposes Sta 1+00 is at the upstream face of the new section of the pier. The void extends approximately 3.0' downstream of Sta 1+00 where it meets steel sheeting. The void extends approximately 11' upstream of Sta 1+00 where it is covered by boulders. The maximum height of the void is 1.2' and the maximum penetration is 12.7'. The width of the footing is approximately 9', so the undermining goes completely under the footing and beneath the mudline on the left side of the pier. See Void Monitoring Chart on Page 6.
This undermining may have been caused by a washout of concrete laitance in addition to a scouring out of bottom materials.

REM.(2)7-98

Attachment 7-2: Level II Underwater Inspection Report, Page 3 of 7

PAGE 4 OF 6

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8. STRUCTURE NO.	INSPECTION DATE
WAREHAM	45K	W-06-016	W06016-45K-DOT-NBI	DEC 11, 2012

REMARKS

Item 61.1 - Channel Scour (Cont'd)

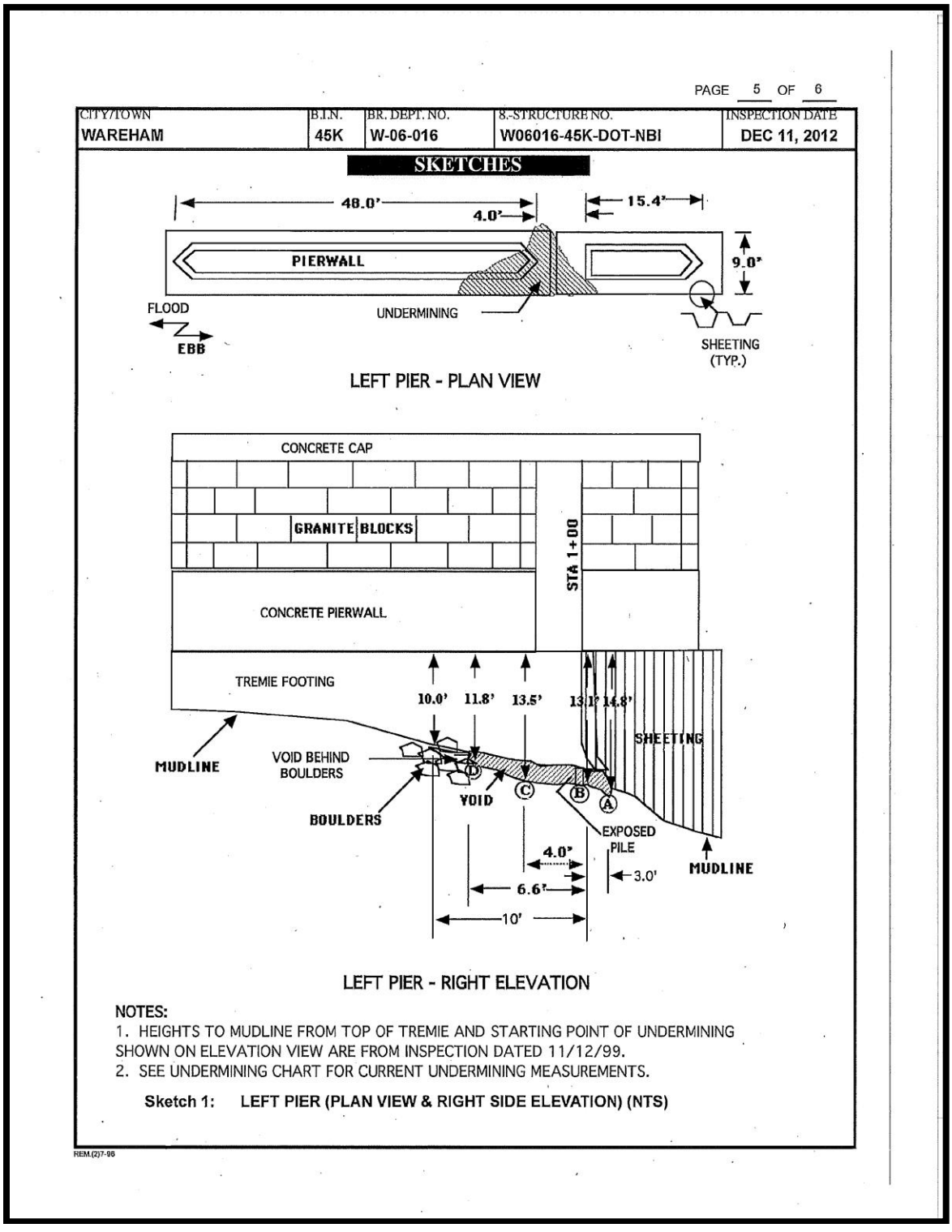
Right Pier:
The sheeting at the new section of the pier is cut off at the top of the footing. The exposed height at the downstream nose is 14.2'.

Item 61.6 - Rip-Rap/Slope Protection
Right Abutment:
Riprap along the right abutment is slumped at the downstream end.
Left Pier:
There are boulders across the upstream nose extending down along the right face to the undermining at the mudline.

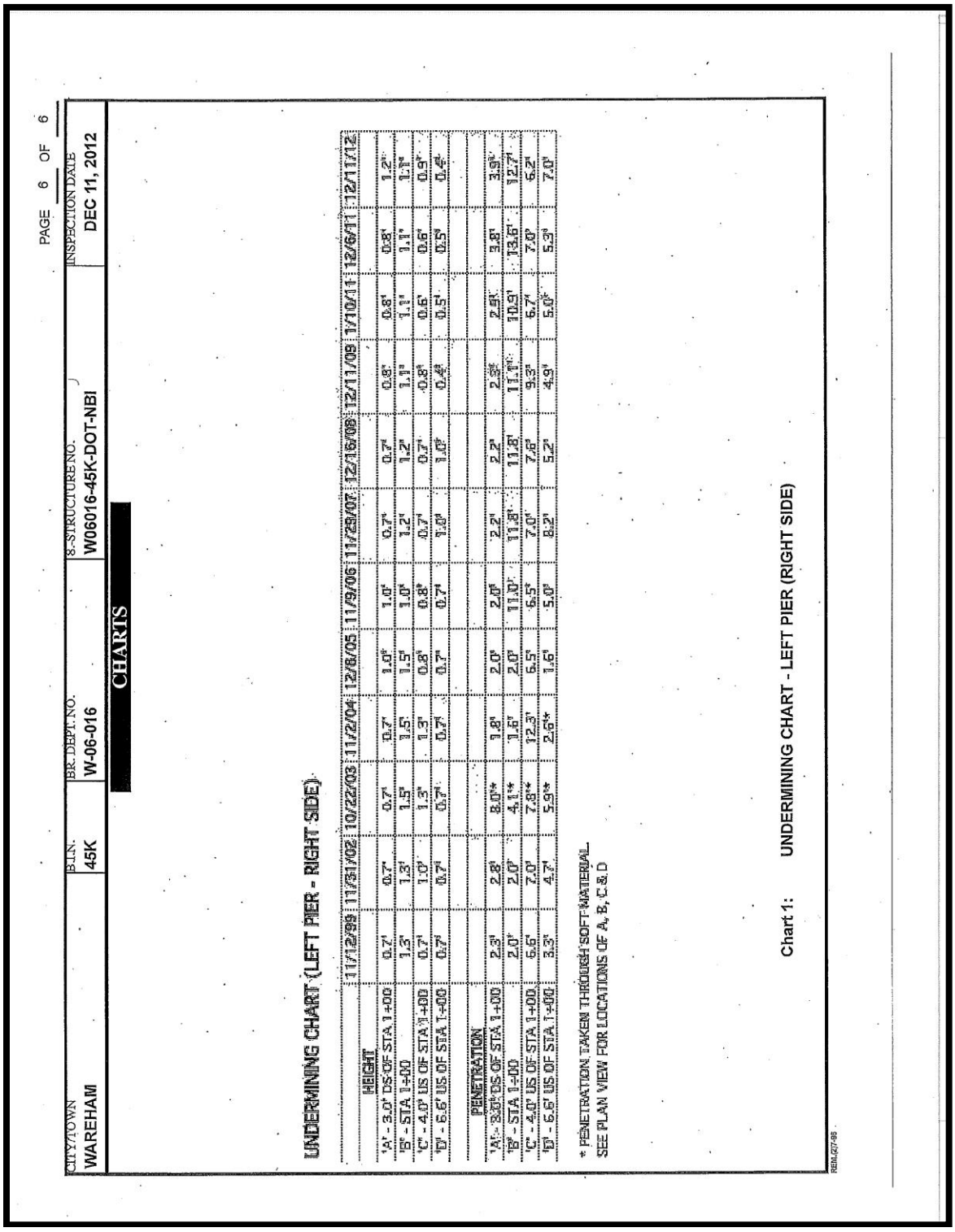
Sketch / Chart Log
Sketch 1 : LEFT PIER (PLAN VIEW & RIGHT SIDE ELEVATION) (NTS)
Chart 1 : UNDERMINING CHART - LEFT PIER (RIGHT SIDE)

REM.(2)7-96

Attachment 7-2: Level II Underwater Inspection Report, Page 4 of 7



Attachment 7-2: Level II Underwater Inspection Report, Page 5 of 7



PAGE 6 OF 6

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
WAREHAM	45K	W-06-016	W06016-45K-DOT-NBI	DEC 11, 2012

CHARTS

UNDERMINING CHART (LEFT PIER - RIGHT SIDE)

	11/12/99	11/31/02	10/22/03	11/2/04	12/8/05	11/9/06	11/29/07	12/15/08	12/11/09	1/10/11	12/6/11	12/11/12
HEIGHT												
'A' - 3.0' DS OF STA 1+00	0.7'	0.7'	0.7'	0.7'	1.0'	1.0'	0.7'	0.7'	0.8'	0.8'	0.8'	1.2'
'B' - STA 1+00	1.5'	1.3'	1.5'	1.5'	1.5'	1.0'	1.2'	1.2'	1.1'	1.1'	1.1'	1.1'
'C' - 4.0' US OF STA 1+00	0.7'	1.0'	1.3'	1.3'	0.8'	0.8'	0.7'	0.7'	0.8'	0.6'	0.6'	0.9'
'D' - 6.6' US OF STA 1+00	0.7'	0.7'	0.7'	0.7'	0.7'	0.7'	1.0'	1.0'	0.4'	0.5'	0.5'	0.4'
PENETRATION												
'A' - 3.0' DS OF STA 1+00	2.3'	2.8'	8.0'*	1.8'	2.0'	2.0'	2.2'	2.2'	2.3'	2.5'	3.8'	3.9'
'B' - STA 1+00	2.0'	2.0'	4.1'*	1.6'	2.0'	11.0'	11.8'	11.8'	11.1'*	10.9'	13.6'	12.7'
'C' - 4.0' US OF STA 1+00	6.6'	7.0'	7.8'*	12.3'	6.5'	6.5'	7.0'	7.6'	9.3'	6.7'	7.0'	6.2'
'D' - 6.6' US OF STA 1+00	3.3'	4.7'	5.9'*	2.6'*	1.6'	5.0'	8.2'	5.2'	4.9'	5.0'	5.3'	7.0'

* PENETRATION TAKEN THROUGH SOFT MATERIAL
SEE PLAN VIEW FOR LOCATIONS OF A, B, C & D

Chart 1: UNDERMINING CHART - LEFT PIER (RIGHT SIDE)

REVISED 7-98

Attachment 7-2: Level II Underwater Inspection Report, Page 6 of 7

Element Data Collection Form

UNDERWATER OPERATIONS DOT

Month	Day	Year
12	11	2012

Bridge Number: W-06-016 Town: WAREHAM

BIN: 45K District: 5

Bridge Key Number: W0601645KDOTNBI

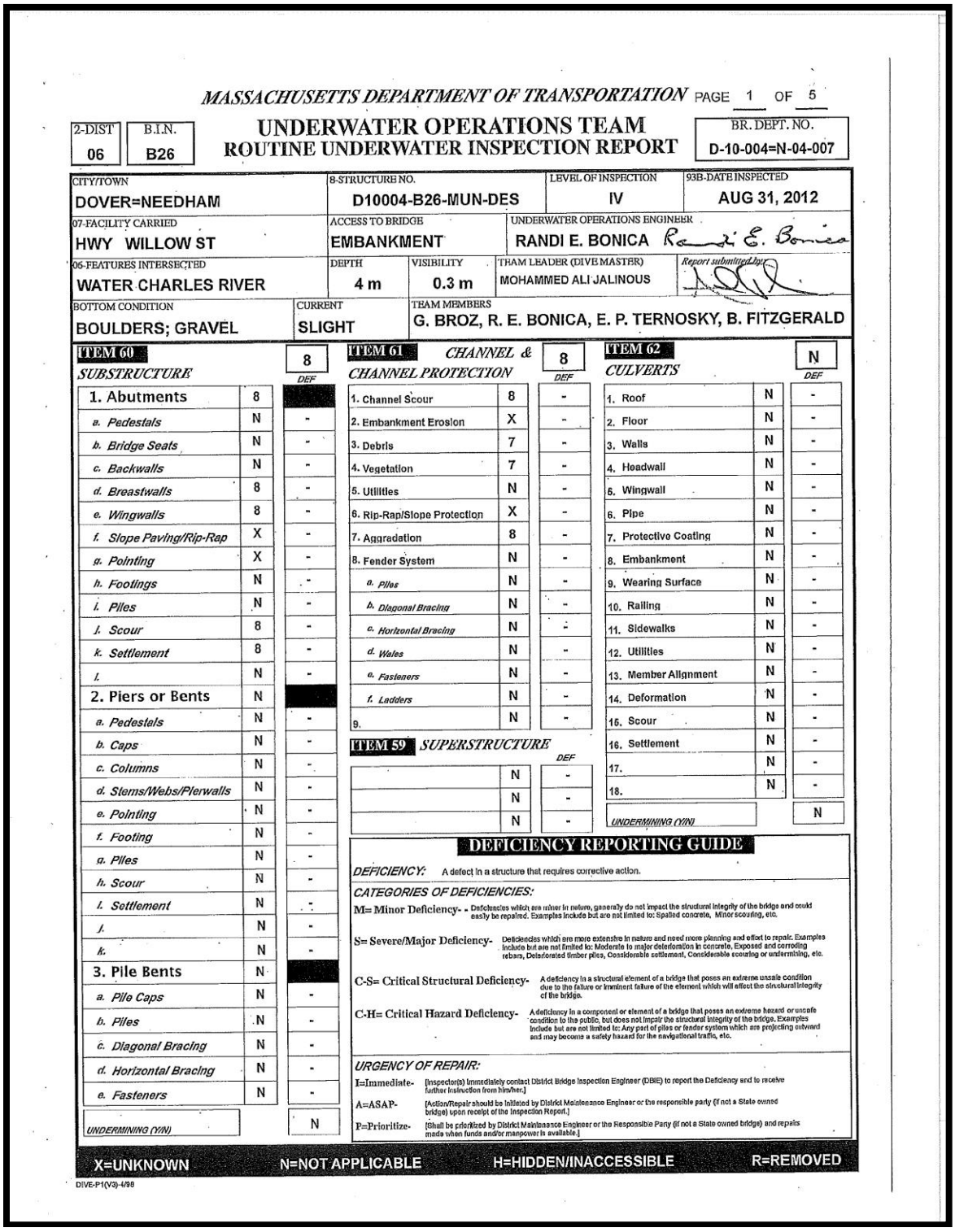
Inspectors: BONICA (*Leader*); COLLERAN, FITZGERALD, TERNOSKY (*Member*)

Elem. #	Element Name	Units	Env-iron.	Total Quantity	Condition States (Quantity or Percent) * 1	2	3	4	5	Q or P *
211	OTHER PIERWALLS	LF	3	127		127				Q
220	SUBMERGED FOOTING	EA	3	2	1	1				Q
361	SCOUR	EA	3	1		1				Q

* It is okay to switch between Quantity and Percent for different Elements.

1

Attachment 7-2: Level II Underwater Inspection Report, Page 7 of 7



MASSACHUSETTS DEPARTMENT OF TRANSPORTATION PAGE 1 OF 5

2-DIST	B.I.N.
06	B26

UNDERWATER OPERATIONS TEAM
ROUTINE UNDERWATER INSPECTION REPORT

BR. DEPT. NO.: D-10-004=N-04-007

CITY/TOWN	8-STRUCTURE NO.	LEVEL OF INSPECTION	93B-DATE INSPECTED
DOVER=NEEDHAM	D10004-B26-MUN-DES	IV	AUG 31, 2012

07-FACILITY CARRIED	ACCESS TO BRIDGE	UNDERWATER OPERATIONS ENGINEER
HWY WILLOW ST	EMBANKMENT	RANDI E. BONICA Randi E. Bonica

06-FEATURES INTERSECTED	DEPTH	VISIBILITY	TEAM LEADER (DIVE MASTER)	Report submitted by:
WATER CHARLES RIVER	4 m	0.3 m	MOHAMMED ALI JALINOUS	

BOTTOM CONDITION	CURRENT	TEAM MEMBERS
BOULDERS; GRAVEL	SLIGHT	G. BROZ, R. E. BONICA, E. P. TERNOSKY, B. FITZGERALD

ITEM 60 SUBSTRUCTURE		8 DEF
1. Abutments	8	
a. Pedestals	N	-
b. Bridge Seats	N	-
c. Backwalls	N	-
d. Breastwalls	8	-
e. Wingwalls	8	-
f. Slope Paving/Rip-Rap	X	-
g. Pointing	X	-
h. Footings	N	-
i. Piles	N	-
j. Scour	8	-
k. Settlement	8	-
l.	N	-
2. Piers or Bents	N	
a. Pedestals	N	-
b. Caps	N	-
c. Columns	N	-
d. Stems/Webs/Pierwalls	N	-
e. Pointing	N	-
f. Footing	N	-
g. Piles	N	-
h. Scour	N	-
i. Settlement	N	-
j.	N	-
k.	N	-
3. Pile Bents	N	
a. Pile Caps	N	-
b. Piles	N	-
c. Diagonal Bracing	N	-
d. Horizontal Bracing	N	-
e. Fasteners	N	-
UNDERMINING (Y/N)		N

ITEM 61 CHANNEL & CHANNEL PROTECTION		8 DEF
1. Channel Scour	8	-
2. Embankment Erosion	X	-
3. Debris	7	-
4. Vegetation	7	-
5. Utilities	N	-
6. Rip-Rap/Slope Protection	X	-
7. Aggradation	8	-
8. Fender System	N	-
a. Piles	N	-
b. Diagonal Bracing	N	-
c. Horizontal Bracing	N	-
d. Wales	N	-
e. Fasteners	N	-
f. Ladders	N	-
9.	N	-

ITEM 59 SUPERSTRUCTURE		DEF
	N	-
	N	-
	N	-

ITEM 62 CULVERTS		N DEF
1. Roof	N	-
2. Floor	N	-
3. Walls	N	-
4. Headwall	N	-
5. Wingwall	N	-
6. Pipe	N	-
7. Protective Coating	N	-
8. Embankment	N	-
9. Wearing Surface	N	-
10. Railing	N	-
11. Sidewalks	N	-
12. Utilities	N	-
13. Member Alignment	N	-
14. Deformation	N	-
15. Scour	N	-
16. Settlement	N	-
17.	N	-
18.	N	-
UNDERMINING (Y/N)		N

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency- Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor scouring, etc.

S= Severe/Major Deficiency- Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroding rebars, Deteriorated timber piles, Considerable settlement, Considerable scouring or undermining, etc.

C-S= Critical Structural Deficiency- A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency- A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Any part of piles or fender system which are projecting outward and may become a safety hazard for the navigational traffic, etc.

URGENCY OF REPAIR:

I=Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her.]

A=ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the responsible party (if not a State owned bridge) upon receipt of the Inspection Report.]

P=Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available.]

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

DIVE-P1(V3)-4/98

Attachment 7-3: Level IV Underwater Inspection Report, Page 1 of 6

PAGE 2 OF 5

CITY/TOWN	B.I.N.	BR. DEPT. NO.	STRUCTURE NO.	INSPECTION DATE
DOVER=NEEDHAM	B26	D-10-004=N-04-007	D10004-B26-MUN-DES	AUG 31, 2012

REMARKS

GENERAL REMARKS

1) Orientation - The abutments are labeled left and right when facing downstream.
2) Sta 10+00 is at the upstream end, at edge of coping.
3) Single span precast concrete arch supported on gravity abutment on top of bedrock (East side) and Steel H-Piles (West side). Originally constructed in 1847, replaced in 1930. It is currently under construction.

ITEM 60 - SUBSTRUCTURE

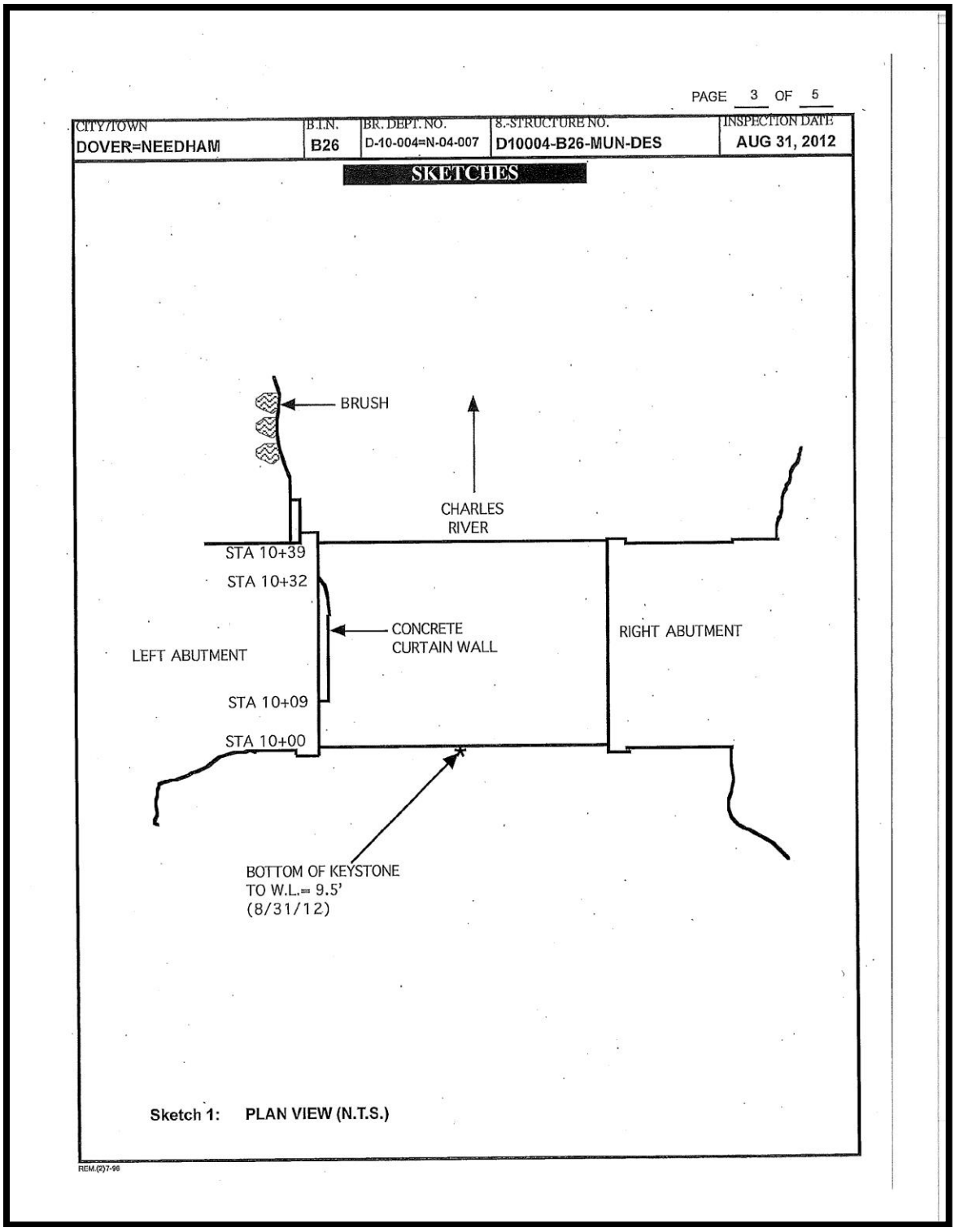
Item 60.1 - Abutments
Item 60.1.d - Breastwalls
Left Abutment:
There are a number of nails and threaded rods sticking out of the vertical face of the breastwall (Contractor to remove prior to the end of construction). There is a concrete curtain wall located from Sta. 10+09 to 10+32, with a toe width of 1' and max. exposed height of 2'.

Right Abutment:
There are a number of nails and threaded rods sticking out of the vertical face of the breastwall (Contractor to remove prior to the end of construction).

Sketch Log
Sketch 1 : PLAN VIEW (N.T.S.)
Sketch 2 : SOUNDINGS - (N.T.S.)
Sketch 3 : ELEVATION VIEW - LOOKING UPSTREAM (N.T.S.)

REM.(2)7-86

Attachment 7-3: Level IV Underwater Inspection Report, Page 2 of 6

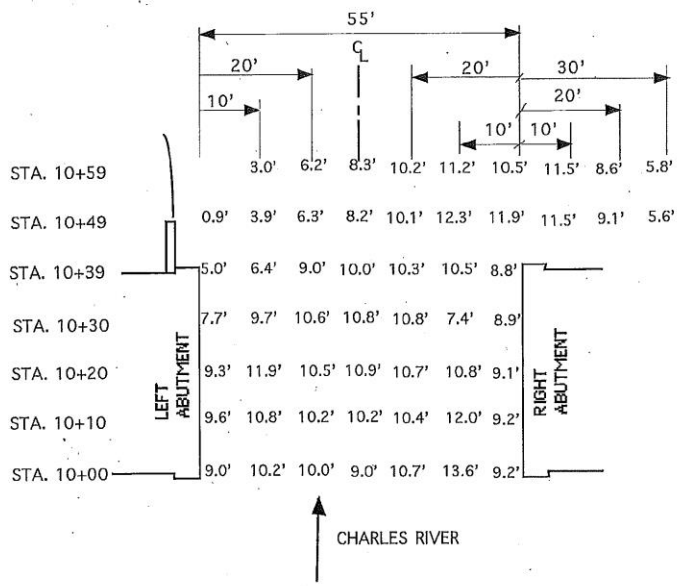


Attachment 7-3: Level IV Underwater Inspection Report, Page 3 of 6

PAGE 4 OF 5

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
DOVER=NEEDHAM	B26	D-10-004=N-04-007	D10004-B26-MUN-DES	AUG 31, 2012

SKETCHES



Notes

1. Water control shot (Y) = Waterline to bottom of Keystone, upstream end.
2. For comparison all soundings are to be adjusted to 2012 water level.
3. STA. 10+00 is located at upstream end of the abutments.
4. No soundings were taken at the upstream end of the bridge because of a construction barge.

Sketch 2: SOUNDINGS - (N.T.S.)

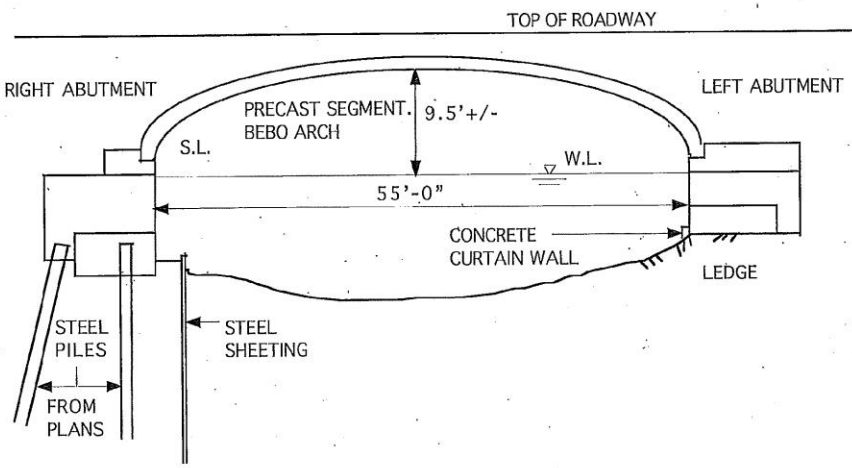
REM.(2)7-96

Attachment 7-3: Level IV Underwater Inspection Report, Page 4 of 6

PAGE 5 OF 5

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8. STRUCTURE NO.	INSPECTION DATE
DOVER=NEEDHAM	B26	D-10-004=N-04-007	D10004-B26-MUN-DES	AUG 31, 2012

SKETCHES



Sketch 3: ELEVATION VIEW - LOOKING UPSTREAM (N.T.S.)

REM.(2)7-68

Attachment 7-3: Level IV Underwater Inspection Report, Page 5 of 6

Element Data Collection Form

UNDERWATER OPERATIONS MASSDOT

Month	Day	Year
8	31	12

Bridge Number: D-10-004 Town: Blackstone

BIN: B26 District: 6

Bridge Key Number: D10004 B26 MUN DES

Inspectors: M. Jalinous (*Leader*), R. Bonica, G. Broz, B. Fitzgerald, E. Ternosky (*Member*)

Elem. #	Element Name	Units	Env-iron.	Total Quantity	Condition States (Quantity or Percent) * 1	2	3	4	5	Q or P *
215	ABUTMENT	LF	2	82	82					Q
144	ARCH	LF	2	39	39					Q

* It is okay to switch between Quantity and Percent for different Elements.

1

Attachment 7-3: Level IV Underwater Inspection Report, Page 6 of 6

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION PAGE 1 OF 4

UNDERWATER OPERATIONS TEAM
UNDERWATER SPECIAL MEMBER INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
04	2PV	L-04-017

CITY/TOWN	8-STRUCTURE NO.	93b-U/W ROUTINE INSP DATE	U/W-SPECIAL MEMBER INSP DATE
LAWRENCE	L04017-2PV-MUN-NBI	Sep 30, 2009	APR 25, 2011

7-FACILITY CARRIED	ACCESS TO BRIDGE	UNDERWATER OPERATIONS ENGINEER
HWY CANAL ST	EMBANKMENT	JOHN B. DESMOND

6-FEATURES INTERSECTED	CURRENT	TEAM LEADER (DIVE MASTER)
WATER SPICKET RIVER	MODERATE	WILLIAM J. COLLERAN

BOTTOM CONDITION	DEPTH	VISIBILITY	Report submitted by:
GRAVEL & BOULDERS	2.5 m	1.2 m	

NEXT U/W ROUTINE INSPECTION DATE	92b-U/W ROUTINE FREQ	TEAM MEMBERS
SEP 30, 2011	Y24	B. FITZGERALD, R. E. BONICA, G. BROZ, J. B. DESMOND

MEMBER / CONDITION Requiring Special Member Inspection

ITEM	MEMBER	REMARKS	CONDITION previous (0-9)	CONDITION present (0-9)	Deficiencies
60.1.	Abutments		3	3	-
60.1. Abutments	d.Breastwalls	See remarks in comments section.	3	3	S-A
60.1. Abutments	k.Settlement	See remarks in comments section.	3	3	S-A

	I-59	I-60	I-61	I-62
(Overall Previous Condition)	-	3	-	-
(Overall Current Condition)	-	3	-	-

CONDITION RATING GUIDE

	CODE	CONDITION	DEFECTS
	N	NOT APPLICABLE	
G	9	EXCELLENT	Excellent condition.
G	8	VERY GOOD	No problem noted.
G	7	GOOD	Some minor problems.
F	6	SATISFACTORY	Structural elements show some minor deterioration.
F	5	FAIR	All primary structural elements are sound but may have minor section loss,cracking,spalling or scour.
P	4	POOR	Advance section loss, deterioration, spalling or scour.
P	3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously effected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
C	2	CRITICAL	Advance deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close bridge until corrective action is taken.
C	1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.
	0	FAILED	Out of service - beyond corrective action.

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

S.M.-P1(V2)-8/02

Attachment 7-4: Example of an Underwater Special Member Inspection, Page 1 of 4

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8-STRUCTURE NO.	INSPECTION DATE
LAWRENCE	2PV	L-04-017	L04017-2PV-MUN-NBI	APR 25, 2011

REMARKS

GENERAL REMARKS
This bridge is a single span fieldstone arch structure.
1) Orientation - Abutments are labeled left and right when facing downstream.
2) Sta 10+00 is at the upstream end of the granite block arch.
3) **Site Conditions:** The bridge is adjacent to a hazardous material clean-up site at the Oxford Mills Demolition Project. Access for this inspection was through the hospital parking lot, around a chain link fence and down a steep slope at the upstream left side of the bridge.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.d - Breastwalls
Left Abutment:
There are random areas of loose and missing chinking stones and small blocks resulting in voids in the breastwall. Numerous fieldstones below the springline and granite blocks above the springline are cracked, split and missing.

Sta 10+09 to 10+14.5: There is a void at the mudline 5.5' long, 3.0' high and 3.0' maximum penetration.
Sta 10+32 to 10+37: There is a stone just above the mudline with a 0.4' wide vertical split. The split runs parallel to the face of the abutment. This block is displaced toward the channel 0.5'.

Right Abutment:
There are random areas of missing chinking stones and small blocks resulting in voids in the breastwall. Numerous fieldstones below the springline and granite blocks above the springline are cracked.

The most significant area is between Sta 10+10 and 10+23. The largest void measures 7.0' long, 4.7' high and 3.6' penetration. Stones in the area of this void are loose and displaced (See Partial Elevation). A previously split and displaced block appears to have only part of that block remaining.

Sta 10+03: There is a void at the mudline. Void length is 3.5', height is 1.5' and penetration is 2.8'.
Sta 10+30: There is a void at the mudline. Void length is 1.5', height is 0.7' and penetration is 2.1'.

Item 60.1.k - Settlement
Left Abutment:
There are random areas of loose and missing chinking stones and small blocks resulting in voids in the breastwall. Numerous fieldstones below the springline and granite blocks above the springline are cracked, split and missing.

Sta 10+09 to 10+14.5: There is a void at the mudline 5.5' long, 3.0' high and 3.0' maximum penetration.
Sta 10+32 to 10+37: There is a stone just above the mudline with a 0.4' wide vertical split. The split runs parallel to the face of the abutment. This block is displaced toward the channel 0.5'.

Right Abutment:
There are random areas of missing chinking stones and small blocks resulting in voids in the breastwall. Numerous fieldstones below the springline and granite blocks above the springline are cracked.

The most significant area is between Sta 10+10 and 10+23. The largest void measures 7.0' long, 4.7' high and 3.6' penetration. Stones in the area of this void are loose and displaced (See Partial Elevation). A previously split and displaced block appears to have only part of that block remaining.

Sta 10+03: There is a void at the mudline. Void length is 3.5', height is 1.5' and penetration is 2.8'.
Sta 10+30: There is a void at the mudline. Void length is 1.5', height is 0.7' and penetration is 2.1'.

Attachment 7-4: Example of an Underwater Special Member Inspection, Page 2 of 4

PAGE 3 OF 4

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
LAWRENCE	2PV	L-04-017	L04017-2PV-MUN-NBI	APR 25, 2011

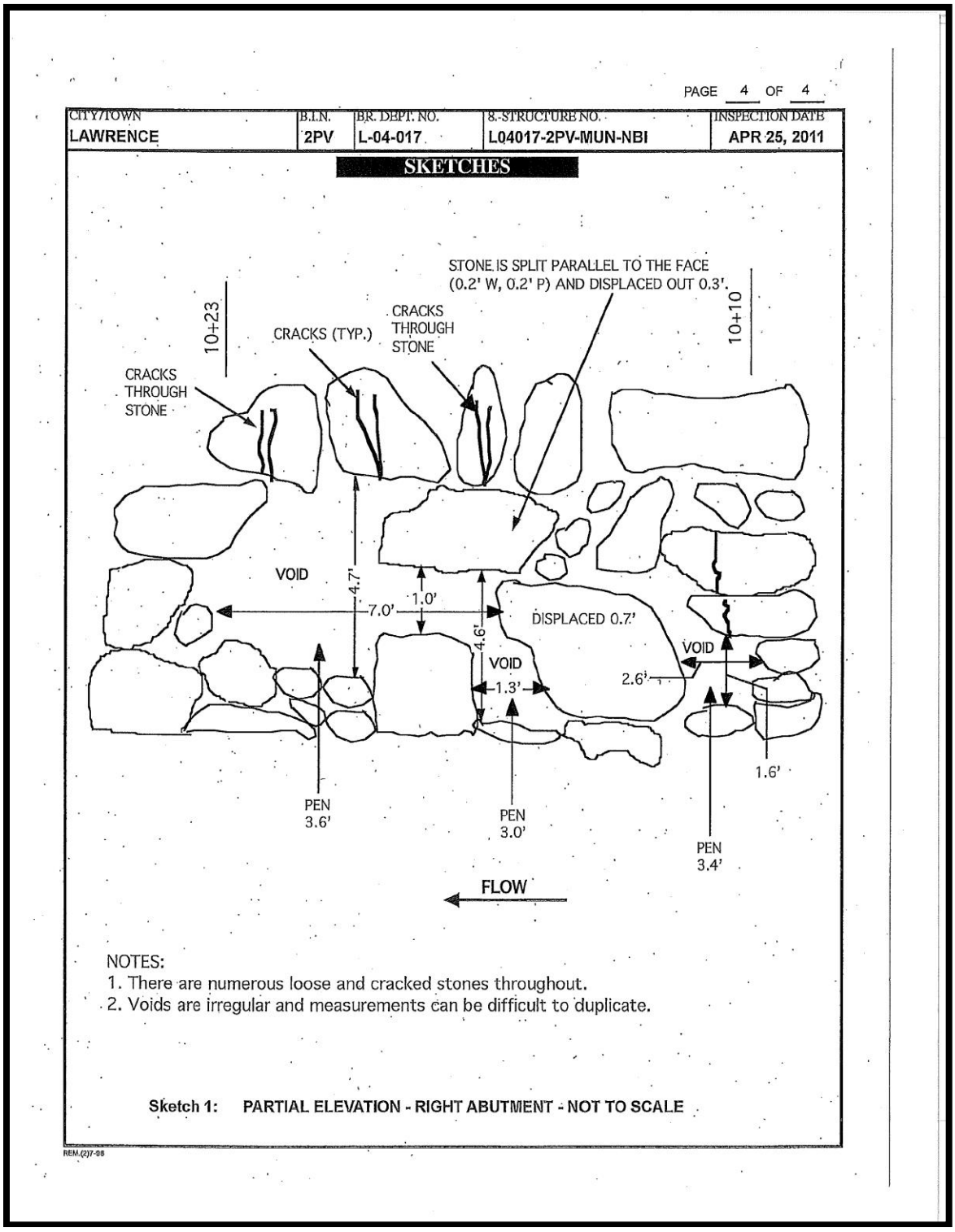
REMARKS

Sketch Log

Sketch 1 : PARTIAL ELEVATION - RIGHT ABUTMENT - NOT TO SCALE

REM.(2)7-99

Attachment 7-4: Example of an Underwater Special Member Inspection, Page 3 of 4



Attachment 7-4: Example of an Underwater Special Member Inspection, Page 4 of 4

Massachusetts Department of Transportation

UNDERWATER OPERATIONS TEAM

DIVERS ACTIVITY REPORT

PAGE 1 OF 1

2-DIST	B.I.N.	BR. DEPT. NO.
4	33A	B-21-005

CITY/TOWN	8-STRUCTURE NO.	LEVEL OF INSP.	93b- INSPECTION DATE
BRAINTREE	B21005-33A-MUN-NBI	I	4/7/10
7-FACILITY CARRIED	**ACCESS TO BRIDGE**	**UNDERWATER OPERATIONS ENGINEER**	
ADAMS STREET	EMBANKMENT	JOHN B. DESMOND	
6-FEATURES INTERSECTED	**DEPTH / VISIBILITY**	**TEAM LEADER (DIVE MASTER)**	*Report submitted by:*
MONATIQUOT RIVER	5' / 5'	A. BONDESON	
BOTTOM CONDITION	**CURRENT**	**TEAM MEMBERS**	
BOULDERS, GRAVEL	SWIFT	BROZ, DESMOND, KYRIAZIDIS, PRENDERGAST	

STORM DAMAGE INSPECTION
(HEAVY RAINS - SPRING 2010)

[X] MAJOR FLOOD DAMAGE

[ ] MINOR FLOOD DAMAGE

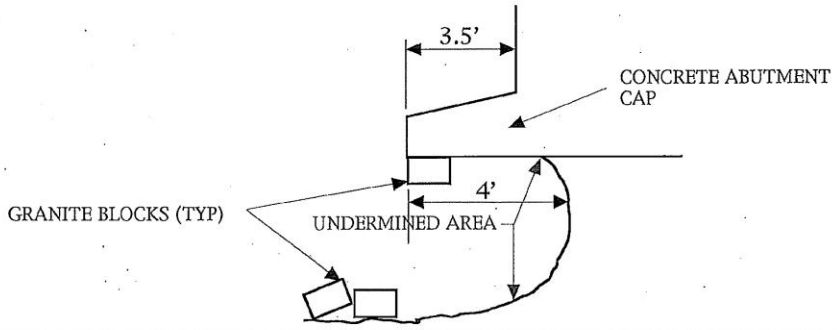
[X] DEBRIS BUILDUP

[ ] NO APPARENT FLOOD DAMAGE

Right Abutment:
There is undermining at the upstream end of the bridge under the concrete abutment cap (15'L x 2.6'H x 4'P). Some granite blocks under concrete abutment cap in the undermined area are missing.

The upstream right concrete retaining wall has undermining along the full length, maximum demensions 1'H x 1'P (maximum dimensions).

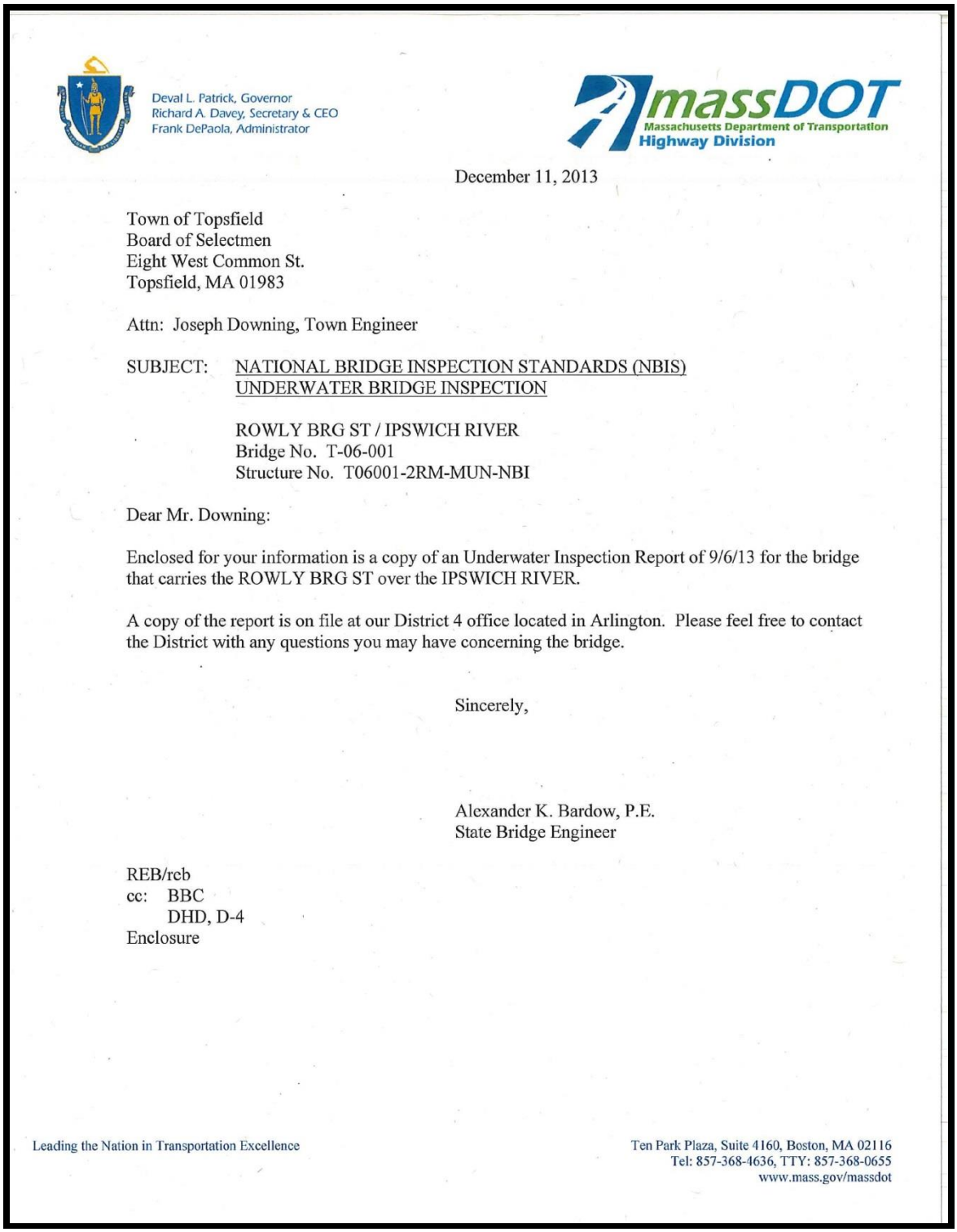
NOTE: Plans show drilled shafts supporting the abutment.



UNDERMINED ELEVATION AT UPSTREAM END SECTION LOOKING DOWNSTREAM

DIVE-P1(V0)-4/09

Attachment 7-5: Example of a Divers Activity Report – Flood Inspection



Deval L. Patrick, Governor
Richard A. Davey, Secretary & CEO
Frank DePaola, Administrator

massDOT
Massachusetts Department of Transportation
Highway Division

December 11, 2013

Town of Topsfield
Board of Selectmen
Eight West Common St.
Topsfield, MA 01983

Attn: Joseph Downing, Town Engineer

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
UNDERWATER BRIDGE INSPECTION

ROWLY BRG ST / IPSWICH RIVER
Bridge No. T-06-001
Structure No. T06001-2RM-MUN-NBI

Dear Mr. Downing:

Enclosed for your information is a copy of an Underwater Inspection Report of 9/6/13 for the bridge that carries the ROWLY BRG ST over the IPSWICH RIVER.

A copy of the report is on file at our District 4 office located in Arlington. Please feel free to contact the District with any questions you may have concerning the bridge.

Sincerely,

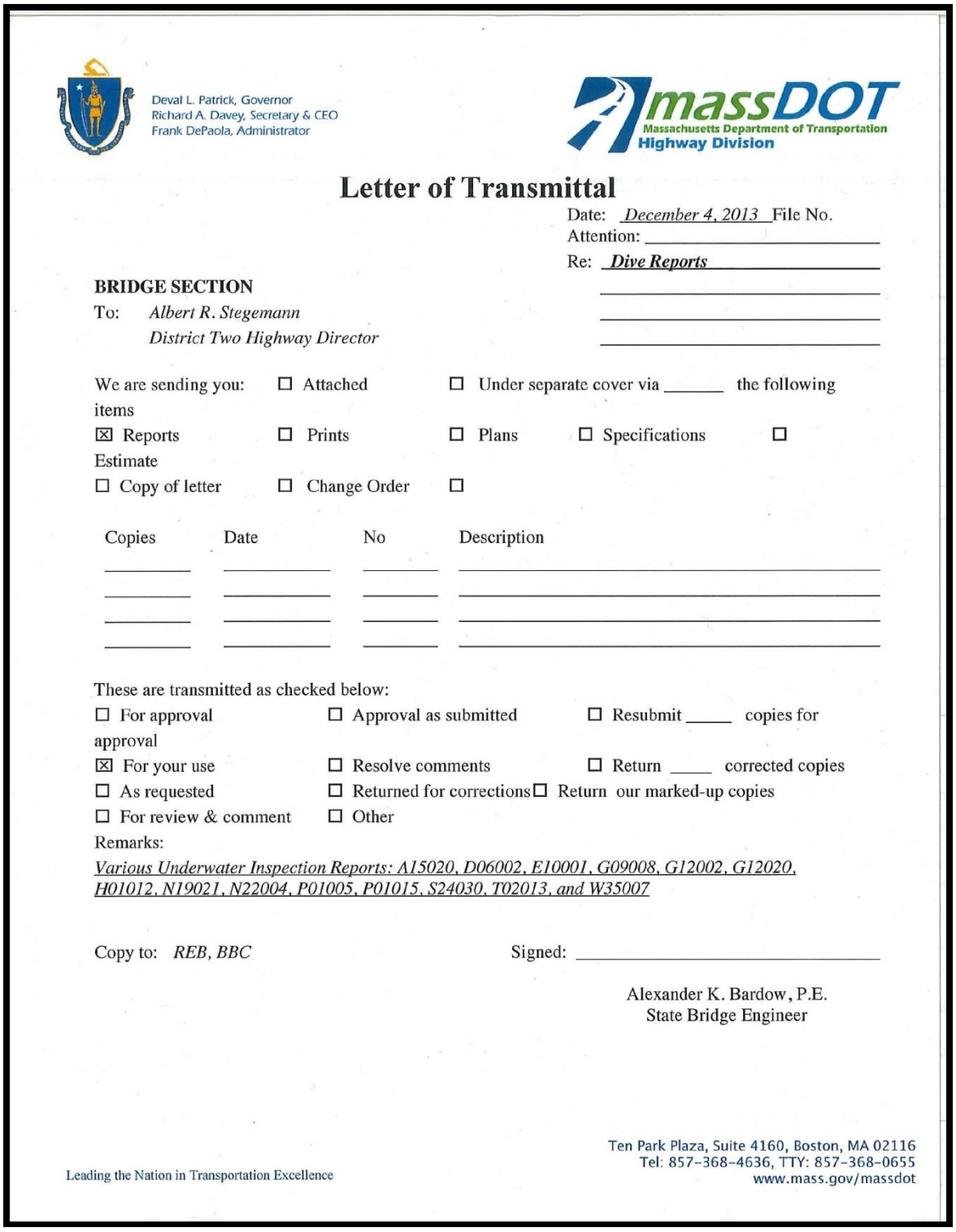
Alexander K. Bardow, P.E.
State Bridge Engineer

REB/rcb
cc: BBC
DHD, D-4
Enclosure

Leading the Nation in Transportation Excellence

Ten Park Plaza, Suite 4160, Boston, MA 02116
Tel: 857-368-4636, TTY: 857-368-0655
www.mass.gov/massdot

Attachment 7-6: Example of a Municipality letter of transmittal



Deval L. Patrick, Governor
Richard A. Davey, Secretary & CEO
Frank DePaola, Administrator

massDOT Massachusetts Department of Transportation Highway Division

Letter of Transmittal

Date: *December 4, 2013* File No.
Attention: _____
Re: ***Dive Reports***

BRIDGE SECTION
To: *Albert R. Stegemann*
District Two Highway Director

We are sending you: ☐ Attached ☐ Under separate cover via _____ the following items
☒ Reports ☐ Prints ☐ Plans ☐ Specifications ☐ Estimate
☐ Copy of letter ☐ Change Order ☐

Copies	Date	No	Description

These are transmitted as checked below:
☐ For approval ☐ Approval as submitted ☐ Resubmit _____ copies for approval
☒ For your use ☐ Resolve comments ☐ Return _____ corrected copies
☐ As requested ☐ Returned for corrections ☐ Return our marked-up copies
☐ For review & comment ☐ Other

Remarks:
Various Underwater Inspection Reports: A15020, D06002, E10001, G09008, G12002, G12020, H01012, N19021, N22004, P01005, P01015, S24030, T02013, and W35007

Copy to: *REB, BBC*

Signed: _____

Alexander K. Bardow, P.E.
State Bridge Engineer

Leading the Nation in Transportation Excellence

Ten Park Plaza, Suite 4160, Boston, MA 02116
Tel: 857-368-4636, TTY: 857-368-0655
www.mass.gov/massdot

Attachment 7-7: Example of state owned letter of transmittal

CHAPTER 8
NON-NBI INSPECTIONS

8.1 INTRODUCTION

This chapter addresses inspections performed by MassDOT that are not included in the National Bridge Inspection program.

There are several types of structures across the Commonwealth that are not included in the National Bridge Inspection program, but are included in the state bridge database. Since inspection of Non-NBI bridges are not mandated by the FHWA, they may not be inspected on an established frequency. Examples of these bridges (with Item 8 Category code) include:

- Bridges that are shorter than the minimum NBI length (BRI) or (CUL)
- Railroad bridges over highways (RRO)
- Privately owned bridges (PRI)
- Bridges that are intended for pedestrian (PED) or bikeway (BKY) use

Special circumstances that would warrant inspecting structures beyond their normal frequency schedules would include "Acts of Nature" such as Floods and Earthquakes.

MassDOT inspects portions of bridges every spring in an attempt to remove concrete deterioration resulting from freeze/thaw cycles before it could fall from structures onto the traveled ways below.

Lastly, this chapter will discuss procedures relating to bridges that are considered to be classified as Major and Critical infrastructure.

8.2 BRI & CUL STRUCTURES

As detailed previously in this Handbook, the Federal Highway Administration mandates that all bridges over twenty feet be inspected in accordance with the National Bridge Inspection Standards. Massachusetts General Laws Chapter 85 Section 35 however, considers any structure on a public highway that has a span in excess of ten feet to be a bridge. Structures that meet the Massachusetts definition of a bridge but not the FHWA definition (i.e. greater than 10 feet up to and including 20 feet) have a designation of BRI for Item 8 Bridge Category Code in the bridge inventory.

MassDOT does keep an inventory of structures that are ten feet or less in span length. These are considered as culverts, regardless of their actual structure type and construction, and have a designation of CUL for the Item 8 Bridge Category Code. In order to be inventoried as a CUL, the structure must be 10 feet or less but greater than 4 feet in span, provided that no opening or pipe diameter comprising the culvert structure, either as a single opening or a multi opening, is less than 4 feet measured square to the side walls.

Massachusetts General Laws do not specify how the span should be measured. For this, MassDOT defers to the NBIS. Span measurements should be taken along the centerline of the roadway to be consistent with NBIS. For superstructures that have bearings the measurement should be from centerline of bearing to centerline of bearing to be consistent with MGL. For bridges such as arches and frames that do not have definite centerlines of bearings the measurement should be from face to face of breastwall (clear opening) as specified by the NBIS.

8.2.1 Inspection of BRI & CUL Structures

It is obviously in the DOT's best interest to monitor conditions of BRI structures as closely as possible given staffing constraints. Scheduling priority within Districts will always be for NBI structures. BRI's should be scheduled for inspection as staffing levels and workloads permit. Scheduling prioritization should consider ADT, age and condition of the structure. MassDOT owned structures should be given priority over municipally owned structures.

Requests by any parties for inspections of BRI structures should be addressed as soon as possible. The DBIE or his/her designee should determine the reason for the inspection request. If there is a concern about structural conditions then an inspection should be scheduled as soon as possible within the constraints of staffing.

MassDOT is in the process of implementing an inspection program for BRI structures, both DOT and Municipally owned. The inspection frequency and reporting process is expected to mirror the requirements of the NBIS.

8.2.2 Documentation of BRI & CUL Structures

All documentation for BRI inspections is to be the same as for NBI bridges. Reports are to be created within 4D. It is possible that an inspection is the first inspection for certain BRI structures. In such cases the inspection Team should gather all inventory information that is missing from the SI&A sheet. Particular attention should be given for determining accurate coordinates for the structure. It would also be helpful to provide a brief location description (Item 9). If a Bridge Number and BIN have not been created for the structure, the DBIE should submit a request through the ABIE.

8.2.3 Distribution of BRI Inspection Reports

One copy of completed and approved inspection reports should be transmitted to the bridge owner with a cover letter signed by the District Highway Director. Until such time as MassDOT implements a BRI inspection program, the letter should clearly indicate that the inspection was provided as a **courtesy** and that **a re-inspection is not anticipated** at this time. It is very important not to use a letter that is intended for NBI bridges, which indicates that follow up inspections will be occurring at regular intervals. It would be clearly wrong to give bridge owners any impression other than that the enclosed report is a one-time occurrence. An example of a transmittal letter to a municipality for a BRI bridge is included as Attachment 8-1.

A copy of the inspection report and letter is to be provided to the Bridge Inspection Engineer for inclusion into the bridge files.

8.3 RAILROAD BRIDGES OVER HIGHWAYS (RRO STRUCTURES)

Bridges carrying railroads by definition are not NBIS structures, because they do not support highway traffic. Many of the railroad bridges do, however, span over roadways. Most of those bridges are owned by railroads or other agencies. However, a small population of these bridges are owned by MassDOT Highway Division.

It is MassDOT Highway Division's policy to periodically inspect DOT owned RRO's for the purpose of protecting the traveling public below. There is no set frequency for inspections of these structures. Scheduling priority within Districts will always be for NBI structures, and then for BRI's. Inspections of RRO's should be

scheduled for inspection as staffing levels and workloads permit. Scheduling prioritization should consider ADT under, structure age and condition. These inspections are not intended to comply with or replace the railroad bridge inspection program that is specified in the Code of Federal Regulations (CFR) 49 Part 237, Bridge Safety Standards, and MGL Chapter 159 Section 83, which put the responsibility for conducting railroad bridge inspections on the operating and bridge owning railroad company respectively.

8.3.1 Inspection of RRO Structures

All documentation for RRO inspections is to be the same as for NBI bridges. Reports are to be created within 4D as "Other" Inspections. It is possible that an inspection is the first inspection for certain RRO structures. In such cases the inspection Team should gather all inventory information that is missing from the Railroad SI&A sheet, see Attachment 8-2. Particular attention should be given for determining accurate coordinates for the structure. If a Bridge Number and BIN have not been created for the structure the DBIE should submit a request through the ABIE.

When inspecting a RRO, the focus of the inspection is on the structural elements in close proximity to the traveled way. It is not necessary to inspect the railroad roadbed, ballast, ties, track, and communication systems. Typical superstructure elements to inspect include exterior faces of through girders, floor beams, underside of ballast plates, and girder bearings. A low vertical clearance measurement should be obtained and recorded. Typical substructure elements to inspect include abutment seats, breastwalls and wingwalls, and pier caps and columns.

8.4 PRIVATELY OWNED BRIDGE (PRI STRUCTURES)

Privately owned bridges are those that are owned by a private entity, such as an individual, corporation, association, society or partnership. Some of these may be on public highways and may be open to use by the travelling public. MassDOT does not inspect privately owned bridges, even if they are on public highways, based on an opinion of the MassHighway (predecessor to MassDOT) Chief Counsel's office that public funds may not be expended to the benefit of private entities.

In addition, MassDOT considers some bridges owned by public entities to be "private" bridges if they are not on public highways or if access to the bridge by the travelling public is restricted by a gate or guardhouse, which allows only authorized users to go over the bridge.

8.5 PEDESTRIAN BRIDGES (PED), BIKEWAY (BKY) AND UTILITY (UTL) STRUCTURES

MassDOT does not typically inspect pedestrian, bikeway, or utility bridges. MassDOT will inspect these bridges if the owner of the structure requests an inspection under special circumstances. The same procedure will be followed as other Non-NBI structures.

8.6 EMERGENCY INSPECTIONS DUE TO ACTS OF NATURE

Following certain acts of nature, it is necessary to perform a visual assessment of effected bridges to assure public safety. This section provides a brief guideline on the implementation of an emergency inspection program that may be required in response to typical acts of nature.

8.6.1 Flood/Tidal Surge

Coastal and/or riverine flooding has become practically a yearly event at some areas of Massachusetts. This Subsection will provide an overview of the Bridge Inspection Unit's response to check for bridge damage during and after flooding events.

8.6.1.1 Available Information

Flood warnings are issued by the National Weather Service at http://www.erh.noaa.gov/er/box/.

Stream flow data is vitally important to forecast flood magnitude and timing and to manage emergency response. The United States Geological Survey (USGS) has a web interface called Water Data for the Nations that provides current and historical steam flow information collected as part of the National Water Information Systems (NWIS). It can be referenced on line at: water.usgs.gov/floods/current.

The FHWA mandates that MassDOT identify which bridges in its inventory are considered to be susceptible to Scour and code them as Scour Critical Bridges on the SI&A sheet under Item 113 (I-113 = 3 or less). For each of the Scour Critical Bridges a Scour Plan of Action (POA) has been developed. The POA contains much information, including recommendations for monitoring the structure during floods and post-flood evaluations. The POA's can be referenced in 4D at the Bridge Input screen under the Scour POA tab.

8.6.1.2 Structures Requiring Condition Assessment

During a flood event determine which areas of the state are expected to be affected. This information is typically available through the National Weather Service, the National Oceanographic and Atmospheric Administration (NOAA), and/or the Massachusetts Emergency Management Agency (MEMA). Affected areas could be identified by Counties, by selected rivers, or by particular coastlines.

Once the affected areas are determined the list of structures that require assessments can be developed by District Bridge Inspection Engineers and the Underwater Operations Engineer as follows in order of priority:

1. Scour critical bridges
2. Other NBI bridges
3. Non-NBI bridges
4. Other requests

The Bridge Inspection Engineer and the Area Bridge Inspection Engineers are available for assistance in developing lists of affected structures.

8.6.1.3 Condition Assessment Procedure

The DBIE is responsible for coordinating all flood/storm surge assessment activity in their Districts. The assessments should be coordinated with the Underwater Operations Team as appropriate.

Prioritized lists of bridges requiring condition assessments should be prepared by the DBIE. The first list should be created to manage and record site assessment information during the flood. It should have columns to record date and time of the assessment visit, a brief description of flow characteristics, and a column to record the high water elevation estimate. The second list should be created that will aid in management of post

flood inspections. It should indicate date of inspection and other comments (such as any follow up inspections needed).

During widespread flood and/or storm surge events it may be necessary to cease all other inspection activities. The Chief Engineer may also direct that all Part Time U/W inspectors be called to Full Time status to assist with the response to the event.

DURING FLOODING:

During high water flows all structures are at risk, but scour critical bridges are determined to have the highest risk. DBIE's should therefore ensure that all MassDOT owned scour critical bridges are monitored during flooding as possible. Municipally owned scour critical bridges are to be monitored by municipal representatives. Suggested flood monitoring plans are offered on the scour POA's in 4D. Visits should be scheduled for periods when flows are expected to be as close to crest level as much as is possible. Other bridges in vicinity of the scour critical bridges should also be monitored as is geographically prudent.

Do not, under any circumstances **enter elevated waters** in order to make an assessment. Assessments during flooding shall be completed from the roadway or embankment by checking for symptoms of stream bed scour such as misalignment of parapets or structural elements and approach roadway settlement. In recent floods much of the damage occurred at approach embankments to bridges. The inspector should also check for accumulation of debris against substructure units that may alter stream flow and exacerbate stream bed scouring.

Since the assessment is not conducted in the water during flooding all assessments can be completed by District inspection staff or municipal representatives. It is not necessary to have Underwater Operations Team members make assessments during flooding on "Dive Bridges".

8.6.1.4 Documentation and Reporting During Flood Assessments

On a list provided by the DBIE's the inspector should note the date and time of the during flood assessment visit. He/she should make a note as to the relative estimated water elevation, perhaps in relation to the low chord of the bridge or to critical water elevation plaquards if installed on scour critical bridges, and provide a description of the intensity of the flow.

The list should be completed by each inspector and provided to the DBIE daily. A compilation of all assessment visit information should be made by the DBIE daily and forwarded to the Bridge Inspection Engineer for use as a status update.

For Scour Critical bridges, also follow the during flood evaluation procedure contained in the POA. This involves documenting each visit to the bridge during flooding on a flood monitoring form. At the conclusion of the flood the completed forms shall be retained in the bridge file.

POST-FLOODING:

As soon as conditions permit, a post flood evaluation should be completed. Suggested post flood inspection tasks are offered on the scour POA's in 4D. Bridges that were closed due to high water during flooding should be evaluated first as conditions permit. It shall be a hands-on inspection assessing damage or structural weakening. The inspectors should note any damage from water flow or debris, undermining of substructure

units, stream bed scour, approach roadway settlement and loss of scour countermeasures such as rip rap or gabions.

Dive bridges should all be inspected by the Underwater Operations Team. Those structures typically inspected by above water teams should be re-inspected by District personnel. In instances where a widespread re-inspection is required, Consultant inspection teams may be contracted to assist the District staff. Such requests for additional consultant assistance must be made to the Bridge Inspection Engineer. Consultant team assignments will also be managed by the DBIE as an extension to their staff.

If the above water inspection team suspects either damage to the substructure units below water or foundation undermining then a follow-up Underwater Inspection by the Dive Unit should be requested.

Coordinate above water and U/W inspections as much as is possible. Dive bridges should be inspected by the Underwater Operations Unit and the above water teams should focus on Non-Dive bridges until such time that all affected structures have been assessed post flood.

8.6.1.5 Documentation and Reporting of Post Flood Assessments

Post flood inspection lists should be completed by each inspection team and provided to the DBIE weekly. A compilation of all lists should be made by the DBIE weekly and forwarded to the Bridge Inspection Engineer for use as a status update.

If no damage has been found then there is no need to create an inspection in 4D. The DBIE shall keep track of the findings based on the flood lists submitted by the teams. If damage is found, then the post flood inspection reports should be completed on the following:

- "Other" inspection report should be used for above water reports
- "Divers Activity Report" should be used by the Underwater Operations Team

Scour Critical bridges have a detailed Post Flood Evaluation process and form. It is contained in the Scour Plan of Action in 4D. Forms shall be completed as suggested in the POA and provided to the DBIE and BIE for inclusion into bridge files.

All inspection reports must be forwarded to the Area Bridge Inspection Engineers for processing and archiving.

8.6.1.6 Flood Assessment Time Frame

Post-flood condition assessment programs should be completed as quickly as possible. All other inspection activities in the affected areas obviously should be ceased until the program is completed.

Should the scope and duration of the post flood assessment program jeopardize the completion of mandated NBI inspections it is acceptable to bring in assistance from Consultants. DBIE's should make requests for consultant assistance as soon as it becomes evident that NBIS inspection frequencies are at risk of being exceeded.

8.6.2 Earthquake

The likelihood of earthquakes in Massachusetts of the magnitude that could damage bridges is not great, but it is a possibility. This Subsection will provide an overview of the Bridge Inspection Unit's response to check for bridge damage after a local seismic event.

8.6.2.1 Structures Requiring Condition Assessment

The areas of the state where seismic activity has been noted should be determined and this area should be the focus of the condition assessment. The first priority is interstate and limited access highway bridges, since these are the primary emergency and evacuation routes. The bridges to be checked include those carrying the road in question as well as those over the road in question, since a problem with a bridge over can close a highway. Next priority is large scale bridges over large rivers such as the Merrimack, Charles, Connecticut and Taunton, regardless of the roadway system, which are major arteries. Multi-span bridges with piers, especially if the bridge consists of simple spans, would be more susceptible to damage. Single span bridges should be less susceptible to damage, based upon past experiences, but they should also be checked.

8.6.2.2 Condition Assessment Procedure

Post-earthquake inspections are intended to screen bridges for any damage, so they need not be a full, in-depth inspection, unless in the opinion of the DBIE that a closer inspection is needed. The bridges can be checked from the ground and from side slopes, etc. For very large structures binoculars should be used. If issues are discovered from the ground then an inspection team should be called out to the bridge for a closer, hand on inspection.

What to look for: Structures should be checked for visual signs of movement of the superstructure – spans mis-aligned or bearings shifted. In the case of bearings, rocker bearings are particularly vulnerable, but sliding plates can also suffer displacement. Concrete piers can exhibit new cracking and spalling, particularly to the columns.

8.6.2.3 Documentation and Reporting

Inspectors should keep a log of the bridges checked, the date of the assessment, and whether or not any potential damage was noted. Also indicate if a closer inspection is warranted. Do not enter the initial check visits into 4D. If a bridge was referred for a closer inspection this follow up inspection would be entered into 4D as an "Other" inspection. Districts should provide a daily summary of inspections completed to the Bridge Inspection Engineer and State Bridge Engineer.

8.6.2.4 Earthquake Assessment Time Frame

Post-earthquake condition assessment programs should be completed as quickly as possible. All other inspection activities obviously should be ceased until the program is completed.

8.7 FREEZE/THAW INSPECTIONS

MassDOT performs annual freeze/thaw inspection on all bridges over public highways per the policy directive P-07-001 dated 3/19/2007, see Attachment 8-3, Annual Freeze/Thaw Bridge Inspection. The policy outlines the purpose, scope and procedure to be used.

These inspections performed identify and address areas where concrete has been weakened by winter freeze/thaw cycles. A hands-on inspection is conducted by a bridge inspector who looks for obvious signs of loose concrete and delaminated concrete, by means of sounding with a hammer. The areas to be examined are the parapet, deck and substructure elements which would have the potential of having concrete fall onto a travel way or pedestrian pathway. District maintenance crews are present at the time of the inspection for the removal of the concrete that may present a safety issue for vehicular and/or pedestrian traffic below the structure.

As the policy states, the Freeze/Thaw Inspections are conducted jointly with the District Bridge Inspection Units and District Maintenance Units. Each District is responsible for set-up and implementation the annual Freeze/Thaw Inspections required within the District Boundary. The Bridge Inspection Unit identifies and maintains the lists of structures with potential problems in the Bridge Management System (4D). Structures are placed into three different categories. The categories are as follows:

- Category 1 - Bridges with known problematic histories of concrete deterioration
- Category 2 - Bridges that have deteriorated concrete but no known prior problematic histories
- Category 3 - Bridges that have neither deteriorated concrete nor a known prior problematic history

If the District Bridge Inspection Unit does not have the manpower available to undertake the Freeze/Thaw Inspections, the DBIE may request of the Bridge Inspection Engineer assistance thru the consultant contracts that he/she oversees for additional manpower. The BIE will then assign the consultants to perform the Freeze Thaw Inspections only if funds are available in the consultant contract. The requests for consultant assistance are to be submitted to the Bridge Inspection Engineer no later than the first workday in March. This will allow time for the coordination that may need to be done with these consultants.

Reports are created and stored for these inspections in the Bridge Inspection Management System (4D) (see Attachment 8-4, Freeze/Thaw Inspection Report).

8.8 BRIDGE SECURITY

The events of the September 11, 2001 attacks on the United States prompted bridge owners to face a new concern: protecting transportation infrastructure from terrorist attack. One of the strategies of prevention is to perform visual inspections of certain critical structures at random intervals during various levels of national alerts. This section provides instructions to the Bridge Inspection Unit personnel on how to conduct inspections of the Major and Critical Structures in the Commonwealth of Massachusetts in the event of National Security situations.

8.8.1 Major and Critical Infrastructure Designation

A Major and Critical Structure is determined by considering many factors including inventory route, average daily traffic, general prominence, and potential for major traffic impacts in case of an emergency closure. MassDOT (MassHighway) performed a vulnerability assessment in 2006 which resulted in a list of bridges that were considered to be Major and Critical Infrastructure.

8.8.2 Alert Levels

The office of Homeland Security has developed five federal alert levels (and associated color codes) for various risks of terrorism as follows.

- Low Alert (Condition Green) – Low risk of terrorist attacks
- Guarded Alert (Condition Blue) – General risk of terrorist attacks
- Elevated Alert (Condition Yellow) – Significant risk of terrorist attacks
- High Alert (Condition Orange) – High risk of terrorist attacks
- Severe Alert (Condition Red) – Severe risk of terrorist attacks

8.8.3 Bridge Security Inspection Objective

The objective of emergency inspections will be to check for suspicious objects or activities on, under or in the vicinity of the subject structures. Inspections should involve driving over and under the structures viewing all accessible areas (with binoculars as necessary). In some cases it may be necessary to park the inspection vehicle in order to view areas of the structures on foot. Inspectors should utilize their knowledge of the structures and land use in their vicinity to determine what may be considered suspicious objects or activities.

It cannot be stressed enough that MassDOT personnel should not investigate or approach objects or activities that are deemed to be of a suspicious nature.

Suspicious Objects and Activities (the following are examples, but not limited to):

- Unattended / Parked vehicles
- Unmarked trucks or vans
- Fuel, chemical, hazardous cargo and such trucks and vans
- Abandoned or unmarked packages, boxes, barrels, luggage or such containers
- Unusual or suspicious activity or persons
- Non permitted or unscheduled work, work crews, traffic control or detours
- Unusual variations on or around a bridge structure, such as freshly dug and refilled holes, burned paint, cut or broken steel, missing catch basin covers, etc.
- Explosives, prima cord (looks like cloth line), or detonating wires connected to bridge members

8.8.4 Inspection Process for Alert Levels

8.8.4.1 Low Alert Situations (Condition Green)

Normal inspection activities with the available staff to transition quickly into a higher level of alert should the need arise.

8.8.4.2 Guarded Alert Situations (Condition Blue)

Normal inspection activities continue, but are supplemented with a visual inspection of all Major and Critical Structures on a random frequency basis. A list of Major and Critical Structures in each District shall be provided by the BIE to each DBIE when this alert is activated.

Inspectors should report any suspicious object or activities to the Massachusetts State Police or MassDOT Radio Room immediately, and then notify the DBIE. The DBIE shall immediately notify concurrently the District Bridge Engineer, who in turn shall immediately notify the District Highway Director and the Area Bridge Inspection Engineer, who in return will immediately notify the Bridge Inspection Engineer and the State Bridge Engineer. The State Bridge Engineer will notify the Chief Engineer.

Since the expedited reporting of any findings up the MassDOT chain of command is critical, if the person you are to report to is unavailable, it is your responsibility to contact the next level(s) of individuals on the command chain up to and including the Chief Engineer.

A record of each inspection shall be written on the log established for these inspections. The DBIE shall maintain a record of inspections performed that shall record the time and date of inspection, the names of the inspector(s), the findings of the inspection and the names of persons notified if anything suspicious found and the time of this notification.

DBIE's should ensure that all Major and Critical Structures are visited at least once **bi-weekly**.

8.8.4.3 Elevated Alert Situations (Condition Yellow)

Normal inspection activities should continue, but be supplemented with a frequent visual inspection of all Major and Critical Structures.

The reporting process should be as stated in Article 8.8.4.2 above.

DBIE's should ensure that all Major and Critical Structures are visited at least **once weekly** during an Elevated Alert. Elevated Alert Inspections should continue until notified by the State Bridge Engineer to resume normal operations.

8.8.4.4 High Alert Situations (Condition Orange)

Normal inspection activities should continue, but be supplemented with a more frequent visual inspection of all Major and Critical Structures.

When the Bridge Inspection Engineer is notified of a High Alert situation, he/she shall immediately notify the Area Bridge Inspection Engineers, who in turn will immediately notify the District Bridge Engineers and District Bridge Inspection Engineers (DBIE).

Emergency Inspection Plan – DBIE's shall develop an inspection plan that will best utilize MHD inspection forces to complete a visual inspection of all Major and Critical Structures at least **twice weekly**. The plan should be reviewed and completely understood by all inspection unit personnel in advance of such events.

The reporting process should be as stated in Article 8.8.4.2 above. A record of each inspection should be maintained as described in Article 8.8.4.2 above.

Additional Structures – It may be necessary to include the inspection of other structures as directed by the Bridge Inspection Engineer to respond to special specific areas of concern and/or vulnerability. In such cases the emergency inspection plan should be amended such that these structures are also included.

8.8.4.5 Severe Alert Situations (Condition Red)

When the Bridge Inspection Engineer is notified of a Severe Alert situation, he/she shall immediately notify the Area Bridge Inspection Engineers, who in turn will immediately notify the District Bridge Engineers and District Bridge Inspection Engineers (DBIE).

Bridge Inspection personnel should suspend regular inspection activities and be prepared to perform visual inspection or damage assessment inspections upon notification.

8.9 DISSEMINATION OF SECURITY SENSITIVE INFORMATION

Documents related to transportation infrastructure are public documents. Documents typically made available include design plans, shop drawings, inspection reports and load rating reports. MassDOT's policy is to provide access to such documents, provided that the access does not jeopardize public safety. Transportation infrastructure has been identified by the United States Department of Homeland Security as a potential target for a terrorist attack. Information relative to the vulnerability of critical transportation infrastructure is considered to be sensitive security information and is not to be made available to the public.

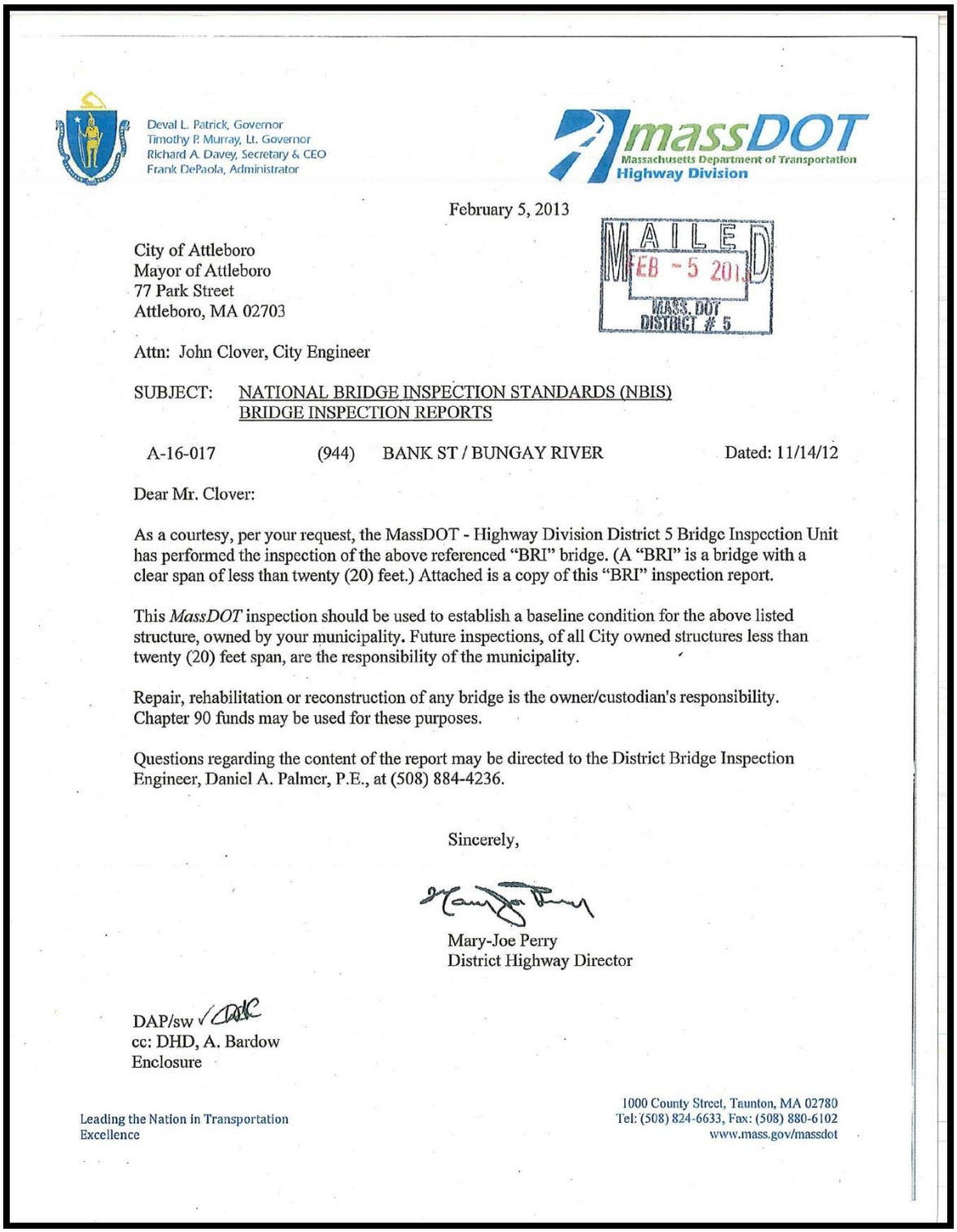
Bridges that appear on MassDOT's Major and Critical Structure list are considered to be security sensitive. A policy has been prepared for the dissemination of information relating to Critical Transportation Infrastructure. Generally requests for information on Major and Critical structures are handled by MassDOT's Chief Counsel's office. They in turn request copies of plans and shop drawings from the Plans and Records department and bridge inspection and/or load rating information from the bridge inspection unit. All requests for any bridge inspection reports received by District Personnel shall be forwarded to the Bridge Inspection Engineer for consideration and action. If districts should receive requests for information on Major and Critical bridges the requests must be referred to the Bridge Inspection Engineer for consideration and action.

8.9.1 Redaction of Inspection Reports

Inspection reports for Major and Critical bridges cannot be released to the general public without removal of information relating to structural vulnerabilities. Prior to release all security sensitive information must be redacted from the report. This is done by electronically blacking out the sensitive information. An obvious example of information that should be redacted from reports would be any fracture critical member designations. Also, since the purpose of inspection reports is to describe deficiencies, any deficiencies that may compromise the structural integrity of members should also be redacted. This includes defect documentation and member location information in text, sketches and photographs. Be aware also to redact photos that have background features that may provide specific location references.

Redaction is typically performed by the Area Bridge Inspection Engineer under guidance from the Bridge Inspection Engineer.

8.10 CHAPTER 8 ATTACHMENTS



Deval L. Patrick, Governor
Timothy P. Murray, Lt. Governor
Richard A. Davey, Secretary & CEO
Frank DePaola, Administrator

MassDOT Massachusetts Department of Transportation Highway Division

February 5, 2013

MAILED FEB - 5 2013 MASS. DOT DISTRICT # 5

City of Attleboro
Mayor of Attleboro
77 Park Street
Attleboro, MA 02703

Attn: John Clover, City Engineer

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE INSPECTION REPORTS

A-16-017 (944) BANK ST / BUNGAY RIVER Dated: 11/14/12

Dear Mr. Clover:

As a courtesy, per your request, the MassDOT - Highway Division District 5 Bridge Inspection Unit has performed the inspection of the above referenced "BRI" bridge. (A "BRI" is a bridge with a clear span of less than twenty (20) feet.) Attached is a copy of this "BRI" inspection report.

This *MassDOT* inspection should be used to establish a baseline condition for the above listed structure, owned by your municipality. Future inspections, of all City owned structures less than twenty (20) feet span, are the responsibility of the municipality.

Repair, rehabilitation or reconstruction of any bridge is the owner/custodian's responsibility. Chapter 90 funds may be used for these purposes.

Questions regarding the content of the report may be directed to the District Bridge Inspection Engineer, Daniel A. Palmer, P.E., at (508) 884-4236.

Sincerely,

Mary-Joe Perry
District Highway Director

DAP/sw
cc: DHD, A. Bardow
Enclosure

Leading the Nation in Transportation Excellence

1000 County Street, Taunton, MA 02780
Tel: (508) 824-6633, Fax: (508) 880-6102
www.mass.gov/massdot

Attachment 8-1: Sample City/Town Letter for BRI's

RAILROAD STRUCTURE INVENTORY AND APPRAISAL SHEET

Report Date: March 27, 2014

State Information

BDEPT#= G01033 Agency Br.No.
Town= Gardner L.O. MHD
B.I.N= 7KL AASHTO= 039.0

Identification

(8) Structure Number G010337KLDOTRRO
RAILROAD BRIDGE NO 0
RAILROAD BRANCH NAME
(2) State Highway Department District 03
(6) Features Intersected HWY PEARSON BLVD
(7) Facility Carried RR BMRR
(9) Location JUST NORTH OF ST 2 ROTARY
(16) Latitude 42 DEG 33 MIN 53.96 SEC
(17) Longitude 71 DEG 58 MIN 43.32 SEC
(98) Border Bridge State Code Share %
(99) Border Bridge Structure No. #

Structure Type and Material

(43) Structure Type Main: Steel Code 302
Stringer/Girder Jointless bridge type: Not applicable
(44) Structure Type Appr:
Other Code 000
(45) Number of spans in main unit 001
(46) Number of approach spans 0000
(107) Deck Structure Type - Steel plate Code 5
(108) Wearing Surface / Protective System:
(omit (a) and (b))
C) Type of deck protection - None Code 0
Ballast:
Type of Ties:

Age and Service

(27) Year Built 1961
(106) Year Reconstructed 0000
(42) Type of Service: On - Railroad
Under - Highway Code 21
(28) Tracks : On Structure 00 Under structure 02

Geometric Data

(48) Length of maximum span 62.992 FT
(49) Structure Length 67.913 FT
(50) Curb or sidewalk: Left FT Right FT
(51) Bridge Roadway Width Curb to Curb FT
(52) Deck Width Out to Out 48.884 FT
(34) Skew 00 DEG (35) Structure Flared
(10) Inventory Route MIN Vert Clear 99 FT 99.00 IN
(47) Inventory Route Total Horiz Clear FT
(53) Min Vert Clear Over Bridge Rdwy 99 FT 099.00 IN N
(54) Min Vert Underclear ref H 13 FT 11.71 IN
(55) Min Lat Underclear RT ref H 6.233 FT
(56) Min Lat Underclear LT FT

Navigation Data

(38) Navigation Control - Not applicable, no waterway Code N
(111) Pier Protection Code
(39) Navigation Vertical Clearance
(116) Vert-lift Bridge Nav Min Vert Clear FT
(40) Navigation Horizontal Clearance FT

Classification — **Code**

(112) NBIS Bridge Length Y
(21) Maintain - State Highway Agency 01
(22) Owner - State Highway Agency 01
(37) Historical Significance built after 1949 presumed to be not eligil Z

Condition — **Code**

(58) Deck 7
(59) Superstructure 7
(60) Substructure 7
(61) Channel & Channel Protection N
(62) Culverts N

Load Rating and Posting — **Code**

(41) Structure - Open A

Appraisal — **Code**

(71) Waterway adequacy N
(72) Approach Roadway Alignment N
(36) Traffic Safety Features N N N N
(113) Scour Critical Bridges N

Proposed Improvements

(75) Type of Work Code 35 1
(76) Length of Structure Improvement 68.897 FT
(94) Bridge Improvement Cost (K) $559
(95) Road Improvement Cost (K) $56
(96) Total Project Cost (K) $839
(97) Year of Improvement Cost Estimate 2008
(114)Future ADT 0
(115)Year of Future ADT 2020

Inspections

(90) Inspection Date 07/03/13 (91) Frequency 24 MO
(92) Critical Feature Inspection: (93) CFI DATE

(A) Fracture Critical Detail	N	00	MO A)	00/00/00
(B) Underwater Inspection	N	00	MO B)	00/00/00
(C) Other Special Inspection	N	00	MO C)	00/00/00
(*) Other Inspection ()	N	00	MO *)	00/00/00
(*) Closed Bridge	N	00	MO *)	00/00/00
(*) UW Special Inspection	N	00	MO *)	00/00/00
(*) Damage Inspection			MO *)	00/00/00

Rating Loads

Report Date 00/00/00

	E80	F40PH	284K	263K
NORMAL				
MAXIMUM				
FATIGUE				

Accessibility (Needed/Used)

N / N	Liftbucket	N / N	Rigging	N / N	Rigging
Y / Y	Ladder	N / N	Staging		
N / N	Boat	N / N	Traffic Control		
N / N	Wader	P / N	RR Flagperson		
N / N	Inspector 50	N / N	Police		

Inspection Hours: 008

Attachment 8-2: Sample SI&A for a RRO Structure

Moving Massachusetts Forward. massDOT Highway

Number: P-07-001
Date: 03-19-07

POLICY DIRECTIVE

Luisa Paiewonsky (signature on original)

COMMISSIONER, HIGHWAY DIVISION

ANNUAL FREEZE/THAW BRIDGE INSPECTION

PURPOSE: The purpose of this Policy Directive is to establish the procedures and protocol by which MassHighway personnel will conduct a yearly inspection for freeze/thaw damage to bridges during the month of April. This Policy Directive replaces and supersedes Policy Directive P-99-008, dated 9/30/99, and any other previously issued directives relative to freeze/thaw bridge inspections.

SCOPE: Annual freeze/thaw bridge inspections will be conducted jointly by the District Bridge Inspection Units and District Maintenance Sections, and will include all bridges over public highways. The purpose of the inspection will be to find areas of concrete that have been weakened by winter freeze/thaw cycles, and to remove any pieces that may present a safety issue for vehicular and/or pedestrian traffic below the structure.

PROCEDURES: All freeze/thaw inspections will be conducted in accordance with the protocols contained in the Yearly Freeze/Thaw Bridge Inspection – Inspection Training Reference Guide. All inspections will be conducted by members of the District Bridge Inspection Unit, with direct assistance from District Maintenance crews. All bridges to be inspected will be prioritized within one (1) of the following categories:

- **1 - Bridges with known problematic histories of concrete deterioration**. Bridges in this category will be inspected first. The District Maintenance section will be responsible for providing all required equipment and Traffic Management Plans (TMPs) in order to perform a thorough close-up inspection and immediately remove all areas of weakened concrete.

- **2 - Bridges that have deteriorated concrete but no known prior problematic histories**. Bridges in this category will initially be inspected via a visual inspection from the ground. Any areas of weakened concrete not determined to pose an immediate safety risk will be clearly identified for removal by a Maintenance crew at a later date during the freeze/thaw inspection period. In the event a close-up inspection is deemed necessary by the District Bridge Inspection Unit, the District Maintenance section will be responsible for providing all required equipment and TMPs in order to perform a thorough close-up inspection and immediately remove all areas of weakened concrete.

- **3 – Bridges that have neither deteriorated concrete nor a known prior problematic history**. Bridges in this category shall only require a visual inspection from the ground. Any potential areas of weakened concrete will be identified for a follow-up close-up inspection and/or removal at a later date if necessary.

REPORTING REQUIREMENTS: Members of the District Bridge Inspection Unit conducting freeze/thaw inspections shall be responsible for completing a STRUCTURES INPSECTION FIELD REPORT – Annual Freeze/Thaw Inspection Report for each bridge inspected, including before and after (remedial action taken) photographs of all problem areas. A copy of this report shall be placed in the individual inspection file for each bridge. Upon completion of the annual freeze/thaw inspection cycle, the District Bridge Inspection Unit shall prepare a report indicating the total number of bridges inspected, the total number of bridges falling into each of the three (3) categories listed above, and the number of bridges that had weakened concrete removed. This report shall be forwarded through the applicable chain of command for review by the Chief Engineer and the Commissioner.

PRE-INSPECTION TRAINING REQUIREMENTS: Prior to the start of the April freeze/thaw bridge inspection cycle, all District Maintenance personnel who will be involved with inspections and/or removal of problematic concrete will undergo inspection training designed to assist them in identifying and distinguishing between concrete that is deteriorated but posing no imminent safety risk and that which has been weakened by freeze/thaw action and may be in danger of falling. This training will be conducted by members of the District Bridge Inspection Unit.

Attachment 8-3: Annual Freeze/Thaw Bridge Inspection Policy, page 2 of 2

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION PAGE 1 OF ____

STRUCTURES INSPECTION FIELD REPORT

ANNUAL FREEZE/THAW INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	INSPECTION DATE

07-FACILITY CARRIED	06-FEATURES INTERSECTED	DIST. BRG. INSP. ENGINEER **M. Azizi**

22-OWNER	21-MAINTAINER	TEAM MEMBERS

ORIENTATION

Note 1: With each problem area, include a photo (with clear description) after action is taken.
Note 2: Describe each problem area with action taken at each area, or any further action required.

Deck (Underside) / Arch Ring :

☐ Not Applicable ☐ No Problem Detected ☐ All Necessary Action taken ☐ Further Action Required

Beams Diaphragms:

☐ Not Applicable ☐ No Problem Detected ☐ All Necessary Action taken ☐ Further Action Required

Concrete Piers / Pier caps /Columns:

☐ Not Applicable ☐ No Problem Detected ☐ All Necessary Action taken ☐ Further Action Required

Others (i.e. Parapets, Haunches, Spandrel Walls, etc.):

☐ Not Applicable ☐ No Problem Detected ☐ All Necessary Action taken ☐ Further Action Required

Freeze/Thaw Priority List :

Attachment 8-4: Annual Freeze/Thaw Inspection Report

CHAPTER 9
MassDOT SUPPLEMENTAL CODING GUIDE

9.1 INTRODUCTION

The purpose of this Supplemental Coding Guide Chapter is two-fold. First, it establishes the MassDOT conventions and interpretations for coding certain items in the Federal Highway Administrations *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*. These MassDOT specific conventions are intended to assure that key information is provided in a consistent manner for all bridges in Massachusetts; so that anyone using the bridge inventory can be assured of the proper meaning of the information provided and that any search of those Items will give consistent and accurate results.

The second purpose is to introduce and define the coding for Massachusetts Specific Items. These Items are used by MassDOT to collect additional information about features of a bridge or bridge inspection that are not found in the FHWA Coding Guide and which cannot be readily found elsewhere. Massachusetts Specific Items are used routinely by MassDOT as part of their operations and decision making process.

Chapter 9 is organized in the same format as the rest of the Bridge Inspection Handbook, with the exception of Section 9.5, Supplemental Coding Guide; Section 9.6, Secondary Records; and Section 9.7, Massachusetts Specific Items. Section 9.5, Supplemental Coding Guide, is organized to follow the numerical sequencing of the FHWA Coding Guide Item numbers, with any additional information pertaining to multiple Item Numbers located in Subsections at the end of Section 9.5. Sections 9.6 and 9.7 are organized by topic in alphabetical order.

9.2 DEFINITIONS TO BE USED WITH THE SUPPLEMENTAL CODING GUIDE

9.2.1 Bridge Number (BDEPT#)

The Bridge Number is used to identify and catalog by city/town a specific crossing of a transportation facility over a depression or obstruction(s) by means of a bridge structure(s). Since it is the transportation facility that defines the crossing, a divided highway would be treated as if it were a single facility. For example, if a divided highway crossed a river, the two bridge structures would have the same Bridge Number. Similarly, a multi-span viaduct would have only one Bridge Number, even though there may be several different obstructions or types of structures involved.

9.2.2 Bridge Key # (BRKEY)

The Bridge Key # is no longer used and is referenced here for historical purposes. The Bridge Key # was discontinued in February 2001 when the current coding for Item 8 was implemented. The Bridge Key # was used to precisely identify a particular bridge structure of bridge crossing. For example, the Bridge Key # would be used to distinguish between northbound/southbound or eastbound/westbound bridge structures on divided highways with the same Bridge Number, as in the example above. A Bridge Key # would also be used to divide up a viaduct into separate spans for inspection and maintenance purposes.

9.2.3 BIN (Bridge Identification Number)

A BIN is used to uniquely identify a specific bridge structure that exists or has existed at some time in the past. Since the Bridge Number is not unique to a specific bridge structure, the BIN is used to track and reference information on a given bridge structure, even though it may have been demolished and its record removed from the active National Bridge Inventory. For example, the BIN will be used to distinguish between northbound/southbound or eastbound/westbound bridge structures on divided highways with the same Bridge Number. A BIN will also be used to divide up a viaduct into separate spans for inspection and maintenance purposes.

9.2.4 Federal Information Processing Standards (FIPS) Code

This information is taken from the current version of The Census of Population and Housing - Geographic Identification Scheme, which applies a numbering system to States, Counties, City(ies)/Town(s), and streets nationwide.

9.2.5 Strategic Highway Corridor Network (STRAHNET)

A system of highways which are strategically important to the defense of the United States. The Military Traffic Management Command Report SE 89-4b-27, Strategic Highway Corridor Network, January 1991, contains additional information on STRAHNET.

9.2.6 Survey Convention

Historically, for surveys made in Massachusetts, baselines run from West to East, and South to North. This convention is to be used in any case where it does not conflict with an existing, established survey. For a STRAHNET highway, the survey convention will always be West to East and South to North.

9.2.7 Orientation

Orientation will depend on the terminations of the road. For example, the orientation of I-495 is South/North even though local portions of it are West/East. Scale the latitude and longitude of the terminations to determine the orientation.

9.2.8 Primary Record

Same as the "on" record referred to in the FHWA Coding Guide. A Primary Record is the bridge inventory record where all applicable NBI data items are coded with respect to the structure and the inventory route on it.

9.2.9 Secondary Record

Same as the "under" record referred to in the FHWA Coding Guide. Only certain NBI data items need be coded for a secondary record, however, all route-oriented data is coded with respect to the route under the bridge.

9.2.10 Town Line Bridge

A bridge that spans over a city/town boundary is called a town line bridge. Since every structure is cataloged by town, a town line bridge will have 2 (or more, if the same structure crosses several city/town boundaries) BDEPT#'s written as an equation, for example: H21035=S18012. For the purpose of NBI coding, the primary bridge record will be assigned to the city/town that appears first on the statewide alphabetical listing of cities/towns (referred to as the primary town). The bridge will also have a dummy bridge record for other city/town (referred to as the adjoining town), however, this record will appear only on the Non-NBIS inventory.

9.3 PROCEDURE FOR ASSIGNING BDEPT NUMBER AND/OR BIN NUMBER

This Section describes procedural steps to be followed in assigning a Bridge Number (BDEPT#) and/or Bridge Identification Number (BIN) to a bridge structure.

The following two situations will warrant the initiation of a Bridge Number and/or BIN request:

1. An existing bridge structure (with a span of 4 ft (1.2 m) or greater) that has not been previously inventoried is found regardless of ownership.
2. A bridge project is about to start the final design stage, either for the rehabilitation or replacement of an existing bridge or for the design of a new bridge on a new road or road segment. Issuance of the BDEPT and/or BIN will ensure that the bridge structure is properly referenced on all construction documents, design calculations, inventory inspection and rating reports.

This process of assigning a BDEPT# and/or BIN starts when a Bridge Number / BIN Request Form is filled out by an authorized requesting party and is submitted to the State Bridge Engineer. Requests must include the necessary back-up material as described below so that the State Bridge Engineer can make a proper determination.

9.3.1 Definitions to be Used When Submitting BDEPT # and/or BIN Requests

- Realigned road: A segment of new road which starts and ends on the same road that the existing bridge is on.
- Relocated road: A segment of new road which starts on but does not end on the same road that the existing bridge is on.
- For the definition of the following types of bridge design projects see the Bridge Manual Part I: Proposed Bridge, Proposed Bridge Rehabilitation, and Proposed Superstructure Replacement.
- Proposed Deck Replacement, where all deck elements are replaced and main load carrying superstructure elements and all substructure elements are retained with retrofits, if required, to meet current code requirements.

9.3.2 General Guidelines for Assigning a Bridge Number and/or Bridge Identification Number

1. A Bridge Number will only be assigned by one person, the State Bridge Engineer, to avoid duplication of assigned numbers. Once a Bridge Number and BIN have been assigned to a specific location and bridge structure respectively, they are not available for use again. These two references shall be used on all correspondence, construction plans, design calculations,

inspection reports, rating reports, or any other documentation or correspondence that deals with the bridge structure.

2. For an existing bridge previously not inventoried: a new Bridge Number and a new BIN will be issued.

3. For an existing bridge under design for a Proposed Bridge Rehabilitation, Proposed Superstructure Replacement, Proposed Deck Replacement: the existing Bridge Number and the existing BIN will be retained.

4. For a Proposed Bridge functional replacement of an existing bridge either: A) in the same location; or B) on a realigned road where at least the existing bridge superstructure will be demolished: the existing Bridge Number will be retained and a new BIN issued.

5. For a Proposed Bridge functional replacement of an existing bridge on a realigned road where the existing bridge structure will be retained in its entirety: a new Bridge Number and a new BIN will be issued.

6. For a Proposed Bridge functional replacement of an existing bridge on a relocated road regardless of whether or not the existing bridge will be demolished in full or in part: a new Bridge Number and a new BIN will be issued.

7. For a Proposed Bridge either on a new road or on an existing road where there was no bridge previously: a new Bridge Number and a new BIN will be issued.

8. If an existing bridge requires that several BIN's be issued for inspection and maintenance purposes: the bridge will be divided up into inspection/maintenance segments before requesting a Bridge Number and BIN. A BIN will be issued for every inspection/maintenance segment.

9. If a Proposed Bridge under design, such as a viaduct, will require several BIN's for inspection and maintenance purposes when it is finished: a new Bridge Number and only one BIN will be issued at the design stage to reserve the Bridge Number/BIN combination for this structure in the Bridge Inventory and for use on correspondence, plans and design calculations. The remaining BIN's will be issued when the structure is completed and ready for the Initial Inventory Inspection. At that time it will be divided up into inspection/maintenance segments and BIN shall be requested for each of those segments.

9.3.3 Existing Structure Not Previously on an Inventory

1. The process for requesting a Bridge Number for an existing structure, not previously inventoried can be initiated by either, the bridge owner, the State Bridge Engineer, Bridge Inspection Engineer, District Highway Director, Area Bridge Inspection Engineer, or District Bridge Inspection Engineer. The requesting party shall fill out the Bridge Number / BIN Request Form and shall attach, at a minimum, the plans (if available), the physical location of the structure (google map, latitude and longitude coordinates), and photos (elevation, underside and approaches).

2. The State Bridge Engineer will forward the request to the Area Bridge Inspection Engineer who will check the Bridge History Books and the NBIS computer inventory to make sure that this

bridge structure has not had a Bridge Number previously issued in the past. After doing so, he/she will sign off on the Bridge Number / BIN Request Form and forward it State Bridge Engineer.

3. The State Bridge Engineer will assign a Bridge Number and forward the request form to the Bridge Information Systems Engineer who will ensure that the sequence of Bridge Number's for the city/town is maintained. If the sequence needs to be adjusted, the Bridge Information Systems Engineer will coordinate with the State Bridge Engineer and agree on the Bridge Number to be used.

4. The Bridge Information Systems Engineer will reserve the Bridge Number in the NBIS computer inventory by creating an initial inventory record which will include at a minimum Items 6 and 7, the Owner and Bridge Category Codes of Item 8, and assigning a BIN(s) to it. After the BIN(s) is (are) established, the Bridge Information Systems Engineer will scan and store the backup documentation and return the completed Request Form and back up documentation to the State Bridge Engineer.

5. The State Bridge Engineer upon receipt of the completed Bridge Number/BIN Request Form from the Bridge Information Systems Engineer will have his/her Administrative Assistant forward the completed Request Form with the new Bridge Number/ BIN(s) and back up documentation to the person who initiated the request with a copy to the Bridge Inspection Engineer.

6. The Bridge Inspection Engineer shall forward the Request Form to the Area Bridge Inspection Engineer who, in turn, will provide the District Bridge Inspection Unit with a copy, create a new file in the Bridge History File for the bridge, and will store the Request Form in that file.

9.3.4 A Bridge Structure Under Design

1. The process for requesting a Bridge Number/BIN for a bridge under design shall be initiated by either: the District Bridge Engineer, Consultant Review Engineer, Bridge Design Engineer, Consultant Project Reviewer or In-House Design Squad Leader. The request shall be made as soon as the scope of work for the project and bridge type has been established. This is typically at the start of the Sketch Plan (25%) phase of design.

2. The person initiating the request will fill out a Bridge Number / BIN Request Form and submit it along with a plan and elevation view of the proposed bridge structure, preferably half size from the Sketch Plans, to the State Bridge Engineer.

3. The State Bridge Engineer shall determine if a new Bridge Number and/or BIN or neither is required. The State Bridge Engineer will indicate this determination on the Request Form. If required, the State Bridge Engineer will assign a Bridge Number and forward request to Bridge Information Systems Engineer who will ensure that the sequence of Bridge Number's for the city/town is maintained. If the sequence needs to be adjusted the Bridge Information Systems Engineer will coordinate with the State Bridge Engineer and agree on the Bridge Number to be used.

4. If only a new BIN is required (the existing Bridge Number remains the same), the Bridge Information Systems Engineer will: create an initial inventory record with the minimal

information required (the new BIN, the existing Bridge Number, Item 6 and Item 7, and a coding of DES for the Item 8 Bridge Category Code); write the new BIN along with the existing Bridge Number on the Request Form; scan and store the backup documentation; return the completed Request Form and back up documentation to the State Bridge Engineer.

7. If both a new Bridge Number and BIN are required, the Bridge Information Systems Engineer will: reserve the Bridge Number assigned by the State Bridge Engineer by creating an initial inventory record with the minimal information required (the new BIN, the new Bridge Number, Item 6 and Item 7, and a coding of DES for the Item 8 Bridge Category Code); write the new Bridge Number and BIN on the Request Form; scan and store the backup documentation; return the completed Request Form and back up documentation to the State Bridge Engineer.

8. The State Bridge Engineer upon receipt of the completed Bridge Number/BIN Request Form from the Bridge Information System Engineer will have his/her Administrative Assistant forward the completed Request Form with the new Bridge Number/ BIN(s) and back up documentation to the person who initiated the request with a copy to the Bridge Inspection Engineer.

9. The Bridge Inspection Engineer shall forward the Request Form to the Area Bridge Inspection Engineer who, in turn, will provide the District Bridge Inspection Unit with a copy, create a new file in the Bridge History File for the bridge, and will store the Request Form in that file.

9.4 CITY/TOWN DATA TO BE USED WITH THE SUPPLEMENTAL CODING GUIDE

The table in Attachment 9-1 provides the city/town specific codes and information that is referenced in the MassDOT Supplemental Coding when coding certain bridge inventory records. The present district number refers to the MassDOT district that the city/town is currently located in. The previous district number refers to the MassDOT district that the city/town was located in prior to the October 1992 redistricting and any subsequent redistricting and is provided for informational purposes only. City names are in bold, all capital lettering. All others names denote towns.

It shall be noted that certain cities/towns had changed districts even before the 1992 redistricting. These earlier district numbers had in that earlier district are given in parenthesis for informational purposes only and some historic data may refer to those earlier districts.

9.5 SUPPLEMENTAL CODING GUIDE

All Item No.'s in this Supplemental Coding Guide refer to the corresponding Data Items in the FHWA Coding Guide. Those items not found in this Supplemental Coding Guide will be coded exactly as specified in the FHWA Coding Guide.

ITEM 2 - DISTRICT

This Item shall be coded by the District. The Item denotes the MassDOT District in which the bridge is located. Use the Present District Number from the table in Attachment 9-1 for the city/town in which the bridge is located.

ITEM 3 - COUNTY

This Item shall be coded by Boston. The Item denotes the Massachusetts County in which the bridge is located. When coding a bridge record, use the 3 digit FIPS COUNTY code from the table in Attachment 9-1 for the city/town in which the bridge is located. To sort bridge records by county, the 3 digit FIPS COUNTY codes for the fourteen Massachusetts counties are as follows:

County	FIPS Code
Barnstable	001
Berkshire	003
Bristol	005
Dukes	007
Essex	009
Franklin	011
Hampden	013
Hampshire	015
Middlesex	017
Nantucket	019
Norfolk	021
Plymouth	023
Suffolk	025
Worcester	027

ITEM 4 - PLACE

This Item shall be coded by Boston. Use the 5 digit FIPS PLACE code from the table in Attachment 9-1 for the city/town in which the bridge is located.

ITEM 5 – INVENTORY ROUTE

This Item shall be coded by both the District and by Boston.

ITEM 6 – FEATURES INTERSECTED

This Item shall be coded by both the District and by Boston. This Item is a 25 character alphanumeric field that is used to identify the feature(s) under the structure being inventoried. The District shall be responsible for coding this Item as part of the Initial Inventory Inspection. The Boston Headquarters shall review and update this Item with information that the District does not have access to and will inform the District of the reason for any changes. For the purpose of writing memos and letters using 4D a Massachusetts coded item that is not governed by the number of characters has been added in Subsection 9.7.5.

MassDOT has a specific convention for coding the data in the first 24 characters of this item. Refer to Subsections 9.5.1 thru 9.5.3 for further information on coding Item 6.

ITEM 7 – FACILITY CARRIED BY STRUCTURE

This Item shall be coded by both the District and Boston. This Item is an 18 character alphanumeric field that is used to identify the transportation facility being carried by the structure being inventoried. The District shall be responsible for coding this Item as part of the Initial Inventory Inspection. The Boston Headquarters shall review and update this Item with information that the District does not have access to and will inform the District of the reason for any changes. For the purpose of writing memos and letters using 4D a Massachusetts coded item that is not governed by the number of characters has been added in Subsection 9.7.5.

MassDOT has a specific convention, which is described below, for coding the data. Refer to Subsections 9.5.1 thru 9.5.3 for further information on coding Item 7.

ITEM 8 – STRUCTURE NUMBER

This Item shall be coded by Boston. This Item is a 15 character alphanumeric field consisting of the 6 character Bridge Number (BDEPT#), the 3 character BIN, the 3 character Owner Code and the 3 character Bridge Category Code that are assigned to a bridge structure (or part of a structure) for precise identification.

The Bridge Number is used to identify and catalog by city/town a specific crossing of a transportation facility over a depression or obstruction(s) by means of a bridge structure(s). Since it is the transportation facility that defines the crossing, a divided highway would be treated as if it were a single facility. For example, if a divided highway crossed a river, the two bridge structures would have the same Bridge Number. Similarly, a multi-span viaduct would have only one Bridge Number, even though there may be several different obstructions or types of structures involved.

For this reason, the BIN is used to precisely identify a particular bridge structure of a bridge crossing that exists or has existed at that location. For the divided highway example above, the BIN would be used to distinguish between the northbound/southbound or eastbound/westbound bridge structures with the same Bridge Number. A BIN would also be used to divide up a viaduct into separate spans for inspection and maintenance purposes.

For reference, Item 8 is coded in the following sequence:

ABCDEFGHIJKLMNO

Where:

ABCDEF	is the BDEPT# (Bridge Number)
GHI	is the BIN (Bridge Identification Number)
JKL	is the Owner Code
MNO	is the Bridge Category Code

For clarity, whenever writing the Structure Number on inspection reports, correspondence, etc., insert a space between the BDEPT#, BIN, Owner Code and Bridge Category Code.

CODING ABCDEF: BDEPT#'s are assigned to both highway and non-highway facilities. The first 3 characters are the city/town code and the last 3 characters are the sequential serial number within the city/town assigned to the bridge.

City/town Code (**ABC**): Use the 3 digit City/Town Code For BDEPT# from the table in Attachment 9-1 for the city/town in which the bridge is located. The first character of this code is the first letter of the city/town name and the second and third characters are the city/town position on a statewide alphabetical list of all cities/towns beginning with the same letter.

Sequential Serial Number (DEF): Assigned by the Data Control Unit. This number starts from 001 and increases sequentially. When a new BDEPT# is issued for a bridge crossing, it is assigned the next unreserved number in the sequence.

NOTE: There are four missing city/town codes in the city/town codes sequence. These missing codes were the ones for the towns of Dana (D02), Enfield (E09), Greenwich (G13) and Prescott (P15), which were abandoned and flooded to create the Quabbin Reservoir, which was built between 1930 thru 1939.

CODING GHI: The BIN, or Bridge Identification Number, is a computer generated 3 digit alphanumeric that is assigned to uniquely and permanently identify a bridge inventory record for every bridge structure in the state. All bridge inventory records, including agencies, railroads, private bridges, etc., have an assigned BIN. The BIN, once assigned to a record, cannot be deleted or modified, and so, can be used to identify inventory records for bridges that have been demolished.

The BIN uses the letters A through Z (excluding the letters O, I, Z and S) and the numerals 0 through 9.

CODING JKL: The Owner Code is a three character alphabetic code which identifies the owner of the bridge, either specifically, as is the case with bridges owned by major state agencies, or generically, as is the case with bridges owned by cities or towns. The Owner Codes are as follows:

DEM	Department of Environmental Management
DOT	Department of Transportation
MBT	Massachusetts Bay Transportation Authority
MDC	Department of Conservation and Recreation (formerly Metropolitan District Commission)
MPA	Massachusetts Port Authority
MUN	City/Town owned bridge
STA	Other state agency
PRI	Privately owned bridge
RRY	Railroad Company owned bridge
WRA	Water Resources Authority

CODING MNO: The Bridge Category Code is a three character alphanumeric code which identifies the category that the bridge falls into. This code is used primarily to distinguish between bridges that belong on the National Bridge Inventory (i.e. that meet the NBIS definition of a bridge) and those that belong on the Non-NBIS Inventory of Bridges and those that are

owned by Federal Agencies. In the case of the Non-NBIS Inventory, this code is used to distinguish bridges based on the type of facility carried by the bridge.

- **NBI Bridges**

NBI A highway bridge which meets the NBIS definition of a bridge (this includes privately owned bridges that are on public ways or that otherwise allow unrestricted use by the public).

634 A Chapter 634 bridge, which is a highway bridge over a railroad that meets the NBIS definition of a bridge whose ownership was transferred to the MassDOT under Chapter 634 of the Acts of 1971.

TMP A temporary bridge greater than 20 feet put in place to carry traffic for a structure that has been closed because of extensive deterioration. These structures can be placed above or adjacent to the closed structure. This designation is not to be used when a temporary structure is in place as part of the Contractor's means and methods of meeting the requirement of stage construction for a bridge replacement project.

- **Non-NBIS Inventory Bridges**

BRI A bridge under Massachusetts law which carries a highway: any structure with a span over 10 feet (3.05 meters) but less than or equal to 20 feet (6.1 meters) measured along the centerline.

BKY Any bridge or structure which carries a bikeway over a depression or other obstruction(s).

BLD Building over a highway.

BTS Boat Section. This is only used for structures that were built as part of Boston's Central Artery/Tunnel project, since normally boat sections are considered to be approaches to a bridge underpass or tunnel.

CLO A bridge or culvert that has been permanently closed for more than 5 years with no access allowed.

CLP A bridge or culvert that has been permanently closed for more than 5 years with pedestrian access allowed.

CUL Any highway structure with a span less than 10 feet (3.05 meters), but greater than 4 feet (1.22 meters), provided that no opening or pipe diameter comprising the structure measures less than 4 feet (1.22 meters).

DES A record used to reserve a BDEPT# and BIN for a new bridge currently under design.

DUM "Dummy" Record denoting an inventory record for the 2nd town of a town line bridge.

PED Any bridge or structure which carries a pedestrian way over a depression or other obstruction(s).

NBP A bridge which meets the NBIS definition of a bridge but is privately owned or publicly owned but access to vehicles is restricted by a gate, guardhouse or other means.

REM A bridge structure that has been physically removed but whose inventory record is being retained as a historic record for archival purposes.

RRO Any bridge or structure which carries a railroad over a depression or other obstruction(s).

TNL Tunnels are defined as enclosed roadways with vehicle access that is restricted to portals regardless of type of structure or method of construction. Tunnels do not include highway bridges, railroad bridges or other bridges over a roadway. Tunnels are structures that require special design considerations that may include lighting, ventilation, fire protection systems, and emergency egress capacity based on the owner's

determination. This is the official AASHTO Definition as adopted by the *AASHTO Subcommittee on Bridges and Structures* in 2008.

TRO Any bridge or structure which carries a transit line over a depression or other obstruction(s).

UTL Bridge carrying only utility(ies).

- **Bridges Owned by Federal Agencies**

Federal agencies, like the Army Corps of Engineers, inspect their own NBIS length bridges and submit SI&A's for these bridges directly to the FHWA in Washington. The FHWA, in turn, sends an electronic copy of this data to the state in which these bridges are located. Since federal agencies have their own convention for coding Item 8, these bridges do not follow the Massachusetts coding procedure outlined above. However, for state inventory purposes, MassDOT appends these records with a BDEPT#, BIN, and Bridge Category Code, which are assigned according to the procedures outlined above, and an Owner Code of FED.

ITEM 16 - LATITUDE

This Item shall be coded by both the District and Boston. Latitude should be coded in degrees, minutes, seconds and hundredths of a second in accordance with the FHWA Coding Guide. All initial inventory inspections shall determine the Latitude of the bridge through the use of a GPS receiver positioned as close to the midpoint of the bridge as possible. In 2013, a consultant was hired to update coordinates utilizing Google maps. On initial inspections, the District shall gather the coordinates and shall forward the information to Boston for verification.

ITEM 17 - LONGITUDE

This Item shall be coded by both the District and Boston. Longitude has been coded the same way as Item 16, except that in Massachusetts, the first digit of longitude is always zero. In 2013, a consultant was hired to update coordinates utilizing Google maps. On initial inspections, the District shall gather the coordinates and shall forward the information to Boston for verification.

ITEM 19 – BYPASS, DETOUR LENGTH

This Item shall be coded by the District. The detour length shall be determined in accordance with the FHWA Coding Guide, except that the detour route will be measured using only unrestricted bridges (either for weight or height limitations), even though a shorter detour route may exist with restricted bridges.

ITEM 26 – FUNCTIONAL CLASSIFICATION OF INVENTORY ROUTE

This Item shall be coded by Boston. The coded to be used is for the inventory route coded in Item 5. Follow the FHWA Coding Guide to determine if a bridge is rural or urban.

System	Code	Description
On	01	Rural Principal Arterial - Interstate
System	02	Rural Principal Arterial - Other

	06	Rural Minor Arterial
	07	Rural Major Collector
	11	Urban Principal Arterial - Interstate
	12	Urban Principal Arterial - Other Freeways or Expressways
	14	Urban Other Principal Arterial
	16	Urban Minor Arterial
	17	Urban Collector
Off	08	Rural Minor Collector
System	09	Rural Local
	19	Urban Local

ITEM 27 – YEAR BUILT

This Item shall be coded by both the District and Boston. This Item denotes the date of construction of the oldest surviving original element of the present bridge, whether that oldest element is a part of the substructure or a part of the superstructure. The District shall be responsible for coding this Item as part of the Initial Inventory Inspection. The Boston Headquarters shall review and update this Item based on historical information that the District does not have access to and will inform the District of the reason for any changes.

Code the actual year the bridge was built and/or opened to traffic. Typically, this would be the date on the endpost. If this is not precisely known, use the advertising date from the plans. Another source is the Cultural Resources Section in Boston, which has done significant research on the history of older and historic bridges. For example, if one abutment wall constructed in 1890 is reused as an abutment of the new bridge structure, Item 27 is coded 1890.

In order for an element to be considered a part of a bridge structure, it must provide structural support, which, if removed, would cause the bridge structure to collapse. This situation may not always be evident, especially with integral abutment bridges, which are built to span over existing abutments that are retained but do not provide structural support.

YEAR BUILT does not reflect the original construction date of any reused structural element, which was not originally built as part of the present bridge that is being inventoried, but which was relocated from its original site and incorporated into the present structure. For example, if a bridge superstructure was moved from its original location and installed on new abutments built in 1996, Item 27 is coded 1996.

YEAR BUILT does not reflect the construction date of any earlier bridge on the site, if no identifiable physical element of that earlier structure can be shown to exist as part of the present bridge. For example, a new integral abutment bridge structure was built in 1996. The existing bridge was demolished except for the abutments that retain earth but do not provide structural support to the new structure. Item 27 is coded 1996.

NOTE: The code year "1850" has been used in the past to denote a bridge built long-ago whose precise date of construction is not known. Inventory records that have this misleading date are still around. Since few bridges of that era remain in the United States at all, a year built date of 1850 should be viewed with skepticism and should not automatically be taken as fact.

ITEM 29 – AVERAGE DAILY TRAFFIC (ADT)

This Item shall be coded by the District. If available, ADT data should be obtained from the Boston Traffic Data section. Otherwise, the traffic volume and truck percentage should be obtained from field observation and counts.

NOTE: 1) The default value calculated to have no effect (plus or minus) on the AASHTO Sufficiency Rating is 49 vehicles/lane.

2) ADT for closed bridges shall be the ADT expected to use the bridge if it were neither closed nor restricted for weight or clearance.

Article 4.5.11.5 of this manual should be referenced for further explanation and procedures on obtaining ADT information.

ITEM 36 – TRAFFIC SAFETY FEATURES

This Item shall be coded by the District. Item 36 consists of four elements, each one digit in length, which for the purposes of this Supplemental Coding Guide will be referred to the same as in the FHWA Coding Guide as follows:

36A Bridge Railings
36B Transitions
36C Approach Guardrail
36D Approach Guardrail Ends

The following single digit numerical code will be used to report the ADEQUACY of the feature being inspected:

1 if the feature **completely** meets the currently acceptable standards.
0 if the feature does **not completely** meet the currently acceptable standards or if a safety feature is required and none is provided.
N if the feature is either obviously not applicable or is not required.

Completely means that the feature has to meet the standards in all locations. This means for both the right and left sides of the bridge and at all four approaches. For bridges on the NHS, the accepted standards are set by regulation and require that the features have been verified by actual crash-tests. Chapter 10 provides examples and guidance to assist the bridge inspector in determining the proper coding for Item 36.

When reporting on adequacy of the traffic safety features, the condition is not relevant. The conditions of the Traffic Safety Feature elements are recorded elsewhere on the Routine Bridge Inspection form as follows:

Item 58.8 – Railing and/or 58.7 - Parapet
Approaches, d. - Guardrail

CODING 36A (Bridge Railings)

The following bridge railings are MassDOT standards. All have been accepted by FHWA as meeting the requirements of NCHRP 350 and/or MASH and so are considered as completely meeting currently acceptable standards.

The S3-TL4 is the same railing as the S3-PL2, except that the designation has been changed to signify that it has been crash-tested in accordance with NCHRP 350 Test Level 4 (TL4) criteria instead of the AASHTO Performance Level 2 (PL2) criteria.

Bridge Manual Name	Bridge Manual Part II Reference
CT-TL2 RAIL	Section 9.2
S3-TL4 RAIL	Section 9.3
CP-PL2 BARRIER	Section 9.4
CF-PL2 BARRIER	Section 9.5
CF-PL3 BARRIER	Section 9.6

The use of these barriers is determined by the application matrix in Part I of the Bridge Manual. Since the CP-PL2 Barrier is used primarily for pedestrian applications, it must always be used either with a Type II protective screen or a hand rail.

There are other railings and railing retrofits, in addition to the ones listed above, that have been crash tested and accepted by FHWA and which have been used by MassDOT or municipalities. When they are encountered, they can be coded as acceptable.

CODING 36B (Transitions)

Most of the older end post transitions that are in use in Massachusetts do not meet current standards. MassDOT has a crash tested standard bridge rail to highway guardrail transitions, also referred to as highway guardrail transitions, for all of the standard MassDOT bridge railings. Standard plans for them are available through the Bridge Section. In addition, there are other crash tested transitions which have been accepted by FHWA that may be used by MassDOT or municipalities where the standard transition is inappropriate.

In order for a highway guardrail transition to be coded as acceptable, even for those that are based on the accepted crash tested standards, the following must hold true:

1) The bridge rail/barrier must transition smoothly into the concrete highway guardrail transition section, and, for metal bridge railings, the rails must be firmly attached to the concrete highway guardrail transition and must not protrude beyond its face.

2) Where there is approach guardrail (see 36C), the approach guardrail must overlap and be firmly attached to the vertical flat surface of the highway guardrail transition. This connection must be solid and fully secured to prevent pull-out.

3) The guardrail system immediately adjacent to the highway guardrail transition must be appropriately and gradually stiffened, from a flexible system to a rigid system.

4) The upstream base of the highway guardrail transition needs to be protected either with a curb or rub rail to prevent vehicle tire snagging.

5) If there is no approach curb off of the bridge, the bridge curb must be tapered away from the roadway so that there is no exposed blunt end to snag the wheels of a car. If there is an approach curb, it must smoothly transition into the bridge curb.

CODING 36C (Approach Guardrail)

Approach guardrails must be structurally sound, will smoothly redirect an impacting vehicle, and will not collapse or otherwise deflect excessively to pocket and snag an impacting vehicle. Guardrails should be installed at all four corners of a bridge, leading as well as trailing ends, since a vehicle must still be smoothly redirected as it exits the bridge after impact.

Guardrails are not always possible, especially in urban areas, where buildings may abut the bridge site and highway guardrail transition. In such cases, the inspector must determine if the lack of a guardrail creates a potentially hazardous situation. For example, if there is a gap between a building and the highway guardrail transition that should be protected by guardrail, then Item 36C is 0. If there is no such gap, and there are acceptable guardrails at the other corners, then Item 36C is 1. If buildings abut the highway guardrail transitions on all four corners with no unprotected gaps so that approach guardrail is not required, then Item 36C is N.

For the purpose of inspecting this item, the minimum Length-of-Need (LON) of approach guardrail typically required to protect the end of a bridge is 25 feet (7.6 meters). However, this length may be deficient for protecting motorists from other hazards that are located off of the roadway, such as trees, sign structures or long, steep slopes. Lengths shorter than 25 feet (7.6 meters) should not be used except for low speed (less than 45 mph) locations and where there are no potential off-road hazards as described above. Similarly, longer lengths are acceptable if they are required as protection from these hazards. The inspector must judge if the LON is sufficient to protect motorists from off-road hazards adjacent to the bridge.

CODING 36D (Approach Guardrail Ends)

The following are currently the only acceptable standards for the treatment of approach guardrail ends:

1) For semi-rigid guardrails, flaring the guardrail away from the roadway at a 15:1 slope beyond the 30 foot (9.144 meter) clear zone and providing a terminal end.
2) Burying the end in the back slope where a natural back slope exists. Burying the end in an earth berm within the clear zone is not an acceptable method.
3) A terminal end that is an accepted, crash tested impact attenuating device. For most highway applications, this will be a flared-type end treatment. However, for guardrail lengths that do not meet the minimum LON and for roads that do not have a runout area, a tangent-type end treatment should be used.
4) No end, since the guardrail is continuous, well beyond the bridge site.

ITEM 37 - HISTORICAL

This Item shall be coded by Boston. This Item is coded as follows for internal MassDOT purposes and is translated to the required FHWA format by the Boston Data Control Unit:

H = Bridge is listed in the National Register of Historic Places (NR), either individually or as a contributing element in an NR Historic District.

E = Bridge has been determined eligible for listing in the NR, either individually or as a contributing element in an historic district, by the Keeper of the National Register.

P = Bridge has been found to be potentially eligible for listing in the NR, either individually or as a contributing element in an historic district.

A = Bridge has been found to be not eligible for individual listing in the NR, but is located in a historic area, that is, in or near a known/potential historic district, or near a known/potential historic property or site.

N = Bridge has been found not eligible for individual NR listing.

C = Bridge has possible historical significance but is less than 50 years old, and has been found, by the Massachusetts Historic Commission (MHC) to be conditionally not eligible for individual listing in the NR because of its age. A "conditionally not eligible" bridge is treated as "not eligible" until it reached 50 years of age; at that point its NR eligibility must be reassessed.

R = Bridge is less than 50 years old, is of a common structural type, and has been found to be conditionally not eligible for individual listing in the NR because of its age and common structural type, by MassDOT's Historic Bridge Specialist.

X = The Bridge's NR eligibility is under dispute or requires further research.

Z = Bridge was built after 1949 and is presumed to be not eligible, pending individual review.

Blank= The Bridge's NR eligibility has not been determined.

For the purposes of review under Section 106 of the National Historic Preservation Act of 1966 (as amended), bridges coded as **H**, **E**, or **P** are considered to be historic. Although bridges coded **A** are not considered to be historic in themselves, projects involving **A**-coded bridges will require review under Section 106 for possible project impacts on nearby historic properties.

For conversion purposes, the MassDOT codes equate to the following FHWA Coding Guide codes:

MassDOT CODE	FHWA CODE
H	1
E	2

P	2
A	3
N	5
C	3
R	3
X	3
Z	5
Blank	4

ITEM 41 – STRUCTURE OPEN, POSTED OR CLOSED TO TRAFFIC

This Item shall be coded by the District. This Item will be coded in accordance with the FHWA Coding Guide except for the following clarifications:

Code

B Massachusetts law (Ch. 85 s. 34) requires that load posting signs be erected not less than 100 feet (30.480 meters) from the bridge. Federal Regulations (23 CFR §650.313 (c)) accept the posting of a bridge in accordance with state law. For the purposes of coding this Item, a bridge will be coded "**P**" (Posted for Load) and not "**B**" (all signs not in place) if all signs are erected in accordance with Massachusetts law even though there are no signs immediately at or on the bridge, provided that there are no intersecting streets between the erected sign and the bridge.

E This is only to be used on the primary record that has been closed and only where a temporary structure has been put in place to carry the legal loads. The temporary structure will have its own structure number and will be coded as outlined in the FHWA Coding Guide.

R This code is to be used on structures with load based restrictions in place that are not individually posted for loads. For example Parkways legally restrict trucks from using the facilities and would be code R. Limited access structures (closed off by fences or bollards) for a majority of the year and have limited use are to be coded R. Improper use of R would be when a structure is restricted for the winter months and then open to the public in the summer months. In this case the proper coding that applies for that structure should be coded under item 41 outlined in the FHWA Coding Guide.

ITEM 48 – LENGTH OF MAXIMUM SPAN

This Item shall be coded by the District. This Item will be coded in accordance with the FHWA Coding Guide except for the following clarification. If the plans show definite centerlines of bearings, use the center to center of bearing points for this dimension. If the plans do not show definite centerlines of bearings, such as for a rigid frame structure, then use the clear open distance between substructure elements.

ITEM 60 - SUBSTRUCTURE

This Item shall be coded by the District. For bridges over water that require a separate dive report to evaluate the condition of the below water component of the substructure, the Condition Rating to be entered for Item 60 shall generally be the lowest controlling condition rating for the substructure from either the above water or the dive report. Refer to Subsection 4.6.9 of this Handbook for an example.

ITEM 61 – CHANNEL AND CHANNEL PROTECTION

This Item shall be coded by the District. For bridges over water that require a separate underwater inspection, the dive team shall code Item 61. However, the above water inspection team may find during their inspection that the condition of one of the inspection sub items for Item 61, which is readily accessible without the need for underwater operation equipment, has changed from the condition noted on the dive report. In such situations, the above water inspection team shall change the condition rating of this sub Item, and note the reason for this change, on the inspection report. If this change necessitates a change in the condition rating for Item 61, the above water inspection team will then also change Item 61 to reflect the lowest controlling condition rating of the inspection sub Items.

For bridges over water that do not require a separate underwater inspection, the above water inspection team shall code Item 61.

ITEM 62 - CULVERTS

This Item shall be coded by the District. In the past, before the adoption of the December 1988 FHWA Coding Guide, all structures greater than 20' in length were considered bridges even if their structure type was more accurately described as a culvert. Thus culverts greater than 20 feet (6.1 meters) in length had Item 62 coded as "**N**". Starting with the December 1988 Coding Guide and continuing with the December 1995 Coding Guide, this is no longer correct. For the proper coding of Items 43, 51, 52, 58, 59, 60 and 62, follow the rules set forth in the 1995 Coding Guide. Do not follow the Massachusetts Definition of a bridge and culvert.

NOTE: In the case of Item 43, ignore factors such as span length, and consider only the design of the structure and then select the category that best describes it. Having selected a code, the following rules must be observed:

1) If either Item 51 (Bridge Roadway Width), or Item 52 (Deck Width) must be **0.0 meters**, then Item 43B must be coded as **"19"** (Culvert).

2) If Item 43B is not **"19"** (Culvert), then Item 51 and Item 52 must contain a non-zero dimension (**not 0.0 meters**). Structures that are coded as a slab (Item 43B = **01**) or as an arch (Item 43B = **11 or 12**) must have Item 51 (Roadway Width) and Item 52 (Deck Width) filled in with a non-zero dimension. In the case where the bridge has no deck, use the roadway width for the deck width. Although illogical, there is no other way to avoid an error check.

3) If Item 43B is "**19**" (Culvert) then Item 58, 59 and 60 must be coded "**N**" and Item 62 must contain a number from **0 to 9**.

4) It is not necessary to code Item 51 (Roadway Width) and Item 52 (Deck Width) as **0.0 meters** for culverts (ITEM 43B = **19**). In a case where a culvert carries a roadway with no or minimal fill and the roadway's width is restricted by the culvert headwalls, Items 51 and 52 should be coded. For coding these Items, refer to the December 1995 Coding Guide. In addition, you should code Item 28, Item 29 and Item 102 if there is any traffic going over the culvert.

5) If traffic rides directly on top of the culvert roof with only a wearing surface and no fill, it may be necessary to rate the roof's condition separate from that of the remaining culvert elements. In this case, do not code the structure as a culvert (Item 43B = **19**) even if the design "looks" like a culvert. Code Item 43B as "**00**" (other) or whatever comes closest to describing the structure type and make sure Item 62 is "**N**". This situation will require a separate condition rating for Items 58, 59 and 60.

NOTE: The following two categories of errors appear frequently:

1) **Bridges that have either Item 51 OR Item 52 coded as 0.0 meters and Item 43B is not coded a "19" (Culvert).** To correct this, fill in Item 51 and/or Item 52 with a valid, non-zero dimension. The other option is to change Item 43B to "19" if the structure really is a culvert. Remember that Items 58, 59 and 60 must be then be changed to "**N**" and Item 62 must contain a valid condition rating.

2) **Item 43 B is "19" (Culvert) and Items 58, 59, 60 are not coded an "N" and/or Item 62 is "N**". To correct this, replace the numerical codes in Items 58, 59 and 60 with "**N**" and place a valid rating between **0 and 9** in Item 62. Alternatively, if the structure appears to have a deck, code 43B a "**00**" (other) or whatever comes closest to describing the structure type and make sure Item 62 is "**N**". Items 58, 59 and 60 must in this case be reexamined.

For a Culvert structure (Item 43B = **19**), use a Culvert Inspection Form; otherwise use a Routine Inspection Report Form.

ITEM 63 – METHOD USED TO DETERMINE OPERATING RATING

This Item shall be coded by Boston. Coding will be in accordance with the FHWA Coding Guide. Refer to Section 9.5.4 for further information on coding Item 63.

ITEM 64 – OPERATING RATING

This Item shall be coded by Boston. Coding will be in accordance with the FHWA Coding Guide. Refer to Section 9.5.4 for further information on coding Item 64.

ITEM 65 – METHOD USED TO DETERMINE INVENTORY RATING

This Item shall be coded by Boston. Coding will be in accordance with the FHWA Coding Guide. Refer to Section 9.5.4 for further information on coding Item 65.

ITEM 66 – INVENTORY RATING

This Item shall be coded by Boston. Coding will be in accordance with the FHWA Coding Guide. Refer to Section 9.5.4 for further information on coding Item 66.

ITEM 67 – STRUCTURAL EVALUATION

This Item shall be coded be Boston. Coding will be in accordance with the FHWA Coding Guide. The Bridge Section's Bridge Information System Unit has a computer program that determines the proper coding for these Items. Inspectors should not attempt to code these Items themselves, but should only ensure that the inventory data which is used to determine the coding for these Items is correct.

ITEM 68 – DECK GEOMETRY

This Item shall be coded by Boston. Coding will be in accordance with the FHWA Coding Guide. The Bridge Section's Bridge Information System Unit has a computer program that determines the proper coding for these Items. Inspectors should not attempt to code these Items themselves, but should only ensure that the inventory data which is used to determine the coding for these Items is correct.

ITEM 69 – UNDERCLEARANCES, VERTICAL AND HORIZONTAL

This Item shall be coded by Boston. Coding will be in accordance with the FHWA Coding Guide. The Bridge Section's Bridge Information System Unit has a computer program that determines the proper coding for these Items. Inspectors should not attempt to code these Items themselves, but should only ensure that the inventory data which is used to determine the coding for these Items is correct.

ITEM 70 – BRIDGE POSTING

This Item shall be coded by Boston. Coding will be in accordance with the FHWA Coding Guide. The Bridge Section's Bridge Information System Unit has a computer program that determines the proper coding for these Items. Inspectors should not attempt to code these Items themselves, but should only ensure that the inventory data which is used to determine the coding for these Items is correct.

ITEM 75 – TYPE OF WORK

This Item shall be coded by Boston. Coding will be in accordance with the FHWA Coding Guide. The Bridge Section's Bridge Information System Unit has a computer program that determines the coding for this Item in conjunction with the coding of Items 94, 95, 96, and 97. Inspectors should not attempt to code these Items themselves.

ITEM 76 – LENGTH OF STRUCTURE IMPROVEMENT

This Item shall be coded by Boston. Coding will be in accordance with the FHWA Coding Guide. The Bridge Section's Bridge Information System Unit has a computer program

that determines the coding for this Item in conjunction with the coding of Items 94, 95, 96, and 97. Inspectors should not attempt to code these Items themselves.

ITEM 90 – INSPECTION DATE

This Item shall be coded by the District. This Item will be coded in accordance with the FHWA Coding Guide and will reflect the date of the last Routine Inspection. When Inspections are extensive and require multiple days to perform, then the start date of the inspection shall be placed in this item.

ITEM 91 – DESIGNATED INSPECTION FREQUENCY

This Item shall be coded by the District. This Item will be coded in accordance with the FHWA Coding Guide and will reflect the most frequent time interval at which the bridge is regularly inspected. This inspection can be either routine, any of the regularly scheduled Critical Feature Inspections, or Closed Bridge Inspection.

ITEM 92 – CRITICAL FEATURE INSPECTION

This Item shall be coded by Boston. This is a 9 character alphanumeric composed of 3 elements, each 3 characters in length, coded in accordance with the FHWA Coding Guide. For the purposes of this Supplemental Coding Guide the 3 elements will be referred to the same as in the FHWA Coding Guide as follows:

92A Fracture Critical Details
92B Underwater inspection
92C Other Special Inspections

- Coding Items 92B and 93B

  If the structure requires an underwater inspection, the inspection frequency will be determined by the Boston Underwater Operations Team and will be coded in Item 92B in accordance with the FHWA Coding Guide. The date of the latest underwater inspection is entered in Item 93B. Both Items are to be coded ONLY by the Underwater Operations Team. In some cases a normally non-dive bridge may be visited and/or inspected by Underwater Operations personnel. In this situation, Item 92B will be coded "N", while Item 93B will coded with the date when the Underwater Operations personnel last visited the bridge.

- Coding Items 92C and 93C

  Items 92C and 93C are used to record the frequency and the date of the latest Special Member Inspection. A Special Member Inspection is used to monitor bridge members for a known deficiency and its frequency is based on the member's condition rating. In addition, if the structure contains unique or special features which require additional attention or procedures that are not typically found in the Bridge Inspectors Reference Manual (BRIM), the inspection of these features will be considered a Special Inspection. The frequency, in months, established to inspect these features will be coded in Item 92C in accordance with the FHWA Coding Guide. The date of the latest Special Inspection is entered in Item 93C.

ITEM 93 – CRITICAL FEATURE INSPECTION DATE

This Item shall be coded by the District. This is a 12 digit numerical composed of 3 elements, each 4 digits in length, coded in accordance with the FHWA Coding Guide. For the purposes of this Supplemental Coding Guide the 3 elements will be referred to the same as in the FHWA Coding Guide as follows:

93A Fracture Critical Details
93B Underwater inspection
93C Other Special Inspections

Refer to Item 92, coding of Items 92B and 93B and coding of Items 92C and 93C for additional reference.

ITEM 94 – BRIDGE IMPROVEMENT COST

This Item shall be coded by Boston. Coding will be in accordance with the FHWA Coding Guide. The Bridge Section's Bridge Information System Unit has a computer routine that determines the coding for these Items in conjunction with the coding of Items 75 and 76. Inspectors should not attempt to code these Items themselves.

ITEM 95 – ROADWAY IMPROVEMENT COST

This Item shall be coded by Boston. Coding will be in accordance with the FHWA Coding Guide. The Bridge Section's Bridge Information System Unit has a computer routine that determines the coding for these Items in conjunction with the coding of Items 75 and 76. Inspectors should not attempt to code these Items themselves.

ITEM 96 – TOTAL PROJECT COST

This Item shall be coded by Boston. Coding will be in accordance with the FHWA Coding Guide. The Bridge Section's Bridge Information System Unit has a computer routine that determines the coding for these Items in conjunction with the coding of Items 75 and 76. Inspectors should not attempt to code these Items themselves.

ITEM 97 – YEAR OF IMPROVEMENT COST ESTIMATE

This Item shall be coded by Boston. Coding will be in accordance with the FHWA Coding Guide. The Bridge Section's Bridge Information System Unit has a computer routine that determines the coding for these Items in conjunction with the coding of Items 75 and 76. Inspectors should not attempt to code these Items themselves.

ITEM 100 – STRAHNET HIGHWAY DESIGNATION

This Item shall be coded by Boston. This Item is used to indicate whether or not the inventory route (identified in Item 5) that the bridge is on is part of the Strahnet System. The Office of Transportation Planning supplies the Bridge Inspection Unit with the interactive maps

for the coding of this item. For the purposes of this Supplemental Coding Guide this item will be referred to the same as in the FHWA Coding Guide as follows:

0 The inventory route **is not** a STRAHNET route
1 The inventory route **is** on a Interstate STRAHNET route
2 The inventory route **is** on a Non-Interstate STRAHNET route
3 The inventory route is on STRAHNET connector route

ITEM 103 – TEMPORARY STRUCTURE DESIGNATION

This Item shall be coded by the District.

ITEM 104 – HIGHWAY SYSTEM OF THE INVENTORY ROUTE

This Item shall be coded by Boston This Item is used to indicate whether or not the Inventory route (identified in Item 5) that the bridge is on is part of the National Highway System. The Office of Transportation Planning supplies the Bridge Inspection Unit with the interactive maps for the coding of this item. For the purposes of this Supplemental Coding Guide this item will be referred to the same as in the FHWA Coding Guide as follows:

0 If the Inventory Route **is not** on the NHS
1 If the Inventory Route **is** on the NHS

ITEM 106 – YEAR RECONSTRUCTED

This Item shall be coded by the District. For the purposes of coding this Item, reconstruction work will include any major bridge work that retains and incorporates any element of the existing bridge into the new structure. The date when this work was completed will be coded in Item 106. Maintenance type work, as defined in the FHWA Coding Guide, is not considered as reconstruction work.

For reference, the following two categories of bridge projects, as defined in Part I of the Bridge Manual, are considered reconstruction work:

- **PROPOSED BRIDGE REHABILITATION** - Some superstructure and substructure elements are replaced and/or existing elements that are to remain are retrofitted to meet current code requirements.

- **PROPOSED SUPERSTRUCTURE REPLACEMENT** - All elements of the superstructure are replaced. Some or all substructure elements are retrofitted to meet current code requirements, or, if required, some, but not all, substructure elements are replaced.

The following category of work is not defined in Part I of the Bridge Manual, but is also considered reconstruction work:

- **PROPOSED DECK REPLACEMENT** - All deck elements are replaced. Main load carrying superstructure elements and all substructure elements are retained with retrofits, if required, to meet current code requirements.

In addition, any work to the main load carrying members that increases their load carrying capacity will be considered a reconstruction and the date that this work was done will be coded in this Item. For example, adding cover plates to a bridge to increase its capacity qualifies as a reconstruction, while adding cover plates to replace section loss due to deterioration does not.

If a bridge structure is replaced in its entirety so that no portion of the original bridge structure is incorporated into the new structure, the date the new bridge was constructed will be coded in Item 27 and Item 106 will be coded 0000, even if portions of the original bridge were physically retained for non-structural purposes. See the MassDOT Supplemental Coding Guide instructions for Item 27 for more information.

ITEM 108 – WEARING SURFACE PROTECTIVE COATING

This Item shall be coded by the District. Item 108 consists of three sub items consisting of Item 108A: Type of Wearing Surface, Item 108B: Type of Membrane, and Item 108C: Deck Protection.

Item 108A, Type of Wearing Surface, shall be coded according to reflect the predominant material present on the existing wearing surface at the time of the inspection. For example, if the original wearing surface according to the construction drawings states that it will be comprised of a bituminous concrete wearing surface, but at the time of the inspection, the wearing surface has in excess of 50% of the wearing surface area patched with concrete patches, then the predominant wearing surface material shall be coded as a monolithic concrete wearing surface.

Item 108B and 108C shall be coded according to the FHWA coding guideline requirements.

ITEM 109 – AVERAGE DAILY TRUCK TRAFFIC

This Item shall be coded by the District. This data may be available from the Traffic Section. If not, generate a number from actual counts taken at the bridge site during the actual inspection. See the MassDOT Supplemental Coding Guide instructions for Item 29 for more information.

ITEM 110 – DESIGNATED NATIONAL NETWORK

This Item shall be coded by Boston. This Item indicates whether or not the inventory route (identified in Item 5) that the bridge is on is part of the National Network for trucks. The Office of Transportation Planning supplies the Bridge Inspection Unit with the interactive maps for the coding of this item.

ITEM 113 – SCOUR CRITICAL BRIDGES

This Item shall be coded by Boston. The initial coding of this Item was determined by the MassDOT Scour Committee in the late 1990's as part of the MassDOT Scour Program. Further evaluations were completed in the early 2010, as part of the MassDOT Scour Plan of Action program. Subsequently, the MassDOT Hydraulics Engineer will be reviewing this coding periodically to determine if, based on more information and the results of additional stream bed

evaluations and/or dive inspections, this coding should be reconsidered. The coding of this Item either for new or rehabilitated bridges or bridges that have had scour countermeasures will also be revised based on a review of the work by the MassDOT Hydraulics Engineer.

ITEM 114 – FUTURE AVERAGE DAILY TRAFFIC

This Item shall be coded by Boston. The intent is to provide a basis for a 20 year forecast for the average daily traffic for the inventory route identified in Item 5. According to the FHWA Coding Guide, the projection shall be at least 17 but no more than 22 years from the date of inspection. So if the projections is for 21 years, this Item can be updated every second inspection (or every 4 years) to stay current. If data is not available from the Traffic Section, a general traffic growth factor used in Massachusetts is 1.022 raised to the 21st power for a 21 year projection, which calculates to a traffic growth factor of 1.5793. This formula dates from 1975, so it should be checked with the Traffic Projection Section of Planning for current statistics.

9.5.1 MassDOT Convention for Coding Item 6 and Item 7

For coding purposes for Item 6, each of the 25 characters is referred to as follows, with **A** denoting the first character:

ABCDEFGHIJKLMNOPQRSTUVWXY

NOTE: The 2001 errata to the FHWA Coding Guide has specified that the 25th character (**Y**), previously used to designate a "Critical Facility", will no longer be coded. A blank space will be inserted in its place.

For coding purposes for Item 7, each of the 18 characters is referred to as follows, with **A** denoting the first character:

ABCDEFGHIJKLMNOPQR

Generally, the first 5 characters (**ABCDE**) are reserved for the MassDOT feature/facility code. The 6th character (**F**) must always be blank. The remaining characters (**G** through **X** for Item 6, or **G** through **R** for Item 7) are reserved for the feature/facility description, which gives the official name or other official identifying designation. Abbreviations may be used where necessary, but every effort shall be made to keep them meaningful. The feature/facility description will always be left justified.

It is understood that there may be situations where the feature/facility description conventions cannot be followed exactly (because of too many features/facilities and the limitation on the number of characters that can be entered). In these situations, the coder will attempt to provide as meaningful description as possible while attempting to adhere to the spirit of these conventions.

Also, when using STREET, ROAD, AVENUE, etc., as part of the feature name, use the appropriate contraction: ST, RD, AVE or AV. When using RIVER, BROOK, STREAM, etc., as part of the feature name, spell it out, except where space limitations do not allow this, then use the appropriate contraction: RIV, R, BRK, BK, STR, etc. When a compass designation is used as part of the street name, such as North Main Street, use only the first letter of the direction, for this example: N MAIN ST, except when a compass direction is the official name of the facility: WEST ST. Omit punctuation marks such as periods in the feature/facility description. For divided highways, specify the orientation of the barrel using the following abbreviation convention: northbound is abbreviated "NB", etc. Do not use periods, such as N.B., in the abbreviations.

A slash (/) is used to distinguish between features/facilities which share a common right of way and an ampersand (&) is used to distinguish between features/facilities which are on separate parallel rights of way.

9.5.2 Coding Item 6 and Item 7 for a Single Feature/Facility

- Interstates: The Feature/Facility Code **A** will be coded "I" and the number of the Interstate will be entered right justified in **BCDE**. On/off ramps from an interstate will have the same feature/facility code as the interstate being accessed. Specify the orientation of the barrel, if only a single barrel is involved. If both barrels of an interstate are involved, omit all references to orientation. For ramps, use the ramp designation found on the plans, such as "RAMP A", and/or orientation, if applicable.

  For example: Interstate 495: I 495

  The numbering of Intestates Routes follows a set convention. One and two digit numbered routes are the main interstate routes that stretch from state to state. Interstate numbers increase from west to east and from south to north.

  Even two digit Interstate numbers indicate west to east routes. Odd one/two digit Interstate numbers indicate south to north routes. Two digit Interstate numbers ending in 0 or 5 are used for routes that extend long distances, typically from coast to coast or border to border.

  Three digit interstate numbers are used in urban areas and denote branches that originate on the main interstate routes. The first digit represents the type of branch and the second and third digits indicate the main interstate route from which the branch originates. If the first digit is even, then the route is a beltway or loop. If the first digit is odd, then the route is a spur that extend from a main route to a city or other location.

  Since three digit Interstates are primarily local branches, these numbers may be repeated from state to state. For example, there is an I-495 in Massachusetts, an I-495 in New York on Long Island, an I-495 around Wilmington, Delaware, and the Capital Beltway in Maryland and Virginia is also I-495. Even numbered three digit interstates can complete the loop to the interstate they start from via another interstate. For example, I-290 in Worcester starts at I-90 in Auburn and completes the loop to I-90 in Westborough via I-495.

- US Routes: The Feature/Facility Code **AB** will be coded "US" and the number of the US Route will be entered right justified in **CDE**. On/off ramps from a US route will have the same feature/facility code as the US route being accessed.

  For example: US Route 202: US202

If the route has limited access barrels including ramps, code the same as for an interstate. If the route has a local street name, enter this starting in **G**.

For example: US 20 N BEACON ST

If the route has an orientation as well as a local street name, enter the orientation abbreviation first, then the local street name, separating the two by a slash (/).

For example: US 20 EB/WASHNGTON

Sometimes, it may be useful to add a description which is not an official name. This description should be added in parenthesis.

For example: US 6 (DRAWBRIDGE)

- State Routes: The Feature/Facility Code **AB** will be coded "ST" and the number of the State Route will be entered right justified in **CDE**. On/off ramps from a state route will have the same feature/facility code as the state route being accessed.

  For example: State Route 109: ST109

  Generally, if a US route has a suffix letter, such as the "A" in Route 122A or Route 2A, the suffix letter is always entered in **G**. If there is also a local name, enter it after the suffix letter, separating the two by a slash (/).

  For example: ST122 A/MAIN ST
  ST 2 A/N MAIN ST

- Local Streets: The Feature/Facility Code **ABC** will be coded "HWY" and **DE** will be left blank. The Feature/Facility description shall be the Official street name.

- Railroads: Feature/Facility Code **AB** will be coded "RR" and **CDE** will be left blank. When entering railroad company names, use the following abbreviations instead of the full name:

Bay Colony Railroad	BCRR
Fore River Railroad	FRR
Grafton & Upton Railroad	GURR
Housatonic Railroad	HRR
MBTA Commuter Rail	MBTA
Massachusetts Central Railroad	MCRR
Massachusetts Coastal Railroad	MACRR
New England Central Railroad	NECR
Pan Am Railroad	PARR
Pioneer Valley Railroad	PVRR
Providence & Worcester Railroad	PWRR

In addition to these active railroad companies, there have been others that have operated in Massachusetts in the past. If a rail line was abandoned and not replaced by another facility, then Item 6 for the bridge over it (or Item 7 if the bridge is an RRO over a road) should still reference the old railroad company that existed at the time of abandonment followed by (ABANDONED) or (ABAND) if space is limited. A partial list of these historic railroad companies is as follows:

Boston and Albany Railroad	BARR
Boston & Maine Railroad	BMRR
Consolidated Rail Corporation	CONRAIL
New York, New Haven and Hartford Railroad	NYNHHRR
Penn Central Railroad	PCRR

AMTRAK preferably should not be abbreviated, however, if this is unavoidable due to space limitations, use AMTK.

CSX Transportation Co. should be listed as CSX without RR after its initials.

Enter the railroad company which provides the flagging services for inspection and is responsible for reviewing bridge plans affecting the railroad. This may or may not be the owner of the railroad right-of-way. For example, the Massachusetts Department of Transportation (MassDOT) owns certain rail lines, but the designated operator (such as Massachusetts Coastal RR) provides the flagging service and so should be entered in the feature/facility description, not MassDOT.

If a second railroad shares the tracks and is also granted the right to review bridge plans by the owner, this company will be entered second in the feature/facility description, separated from the first by a slash (/).

Do not enter the railroad's official branch name. This will be entered as a Massachusetts specific item. Do not enter a railroad which only has trackage rights to operate trains but has no right for review of plans.

In the case of MBTA commuter rail lines, since July 1, 2014, Keolis Commuter Services shall operate the commuter trains and provide flagging services under contract for the MBTA, however, Keolis Commuter Services should not be listed in the feature/facility description along with the MBTA.

- Rapid Transit Lines: The Feature/Facility Code **AB** will be coded "TR" and **CDE** will be left blank. Enter the official name of the transit line. In the case of MBTA rapid transit lines, this would be the line's standard color reference.

  For example: RED LINE

If space is limited, abbreviate the MBTA color code as follows:

Blue Line	BLUE	
Orange Line	ORNG	
Red Line	RED	(North of JFK station)
Red Line SSH	REDS	(Braintree Line)
Red Line AMT	REDA	(Ashmont Line)
Red HSL	RHSL	(Mattapan-Ashmont HSL)
Silver Line	SILV	
Green Line D	GRND	(Riverside Line)

(If other Green Line branches need to be entered, follow the same convention as above).

- Bodies of Water: This includes rivers, streams, brooks, tidal inlets, etc. The Feature/Facility Code **ABCDE** will be coded "WATER". The Feature/Facility Description shall be the official geographical name for the river, stream, pond etc.

- Town Line Bridges: The Feature/Facility Code **ABCDE** will be coded "OTHER". The Feature/Facility description shall enter the following:

  - Item 6: The two BDEPT#'s as an equation, with the primary record BDEPT# first

  - Item 7: Roadway name. If roadway name is different from the primary record then the adjoining City/Towns' roadway name shall be entered.

    For example: Same roadway name in each City/Town

    Item 6 is OTHER H21035=S18012
    Item 7 is OTHER US202

    For example: Different roadway name in adjoining City/Town

    Item 6 is OTHER F01001=N06002
    Item 7 is OTHER COGGSHALL ST

- Removed Bridges: The Feature/Facility Code **ABCDE** will be coded "OTHER"

  - For bridges that have been permanently removed without replacement, the Feature/Facility Description shall enter the following:

    - Item 6: Name of original facility/feature intersected, compressed as required

      For example: BMRR/BEAR DEN RD
      CROSS RD/NORTH R

- Item 7: REMOVED
  This may be modified to provide additional information about historical circumstances regarding the removal of this bridge, if this information is available, such as:

  WASHED OUT 1955
  FILLED IN 1984

- For bridges that have been functionally replaced by a structure with another BDEPT#, the Feature/Facility Description shall enter the following:

  - Item 6: REPLACED BY (*BDEPT# of the bridge that replaced this bridge*)

    For example: REPLACED BY A15018

  - Item 7: REMOVED

- For bridges that have been functionally replaced by a structure with another BIN but the same BDEPT#, the Feature/Facility Description shall enter the following:

  - Item 6: REPLACED BY (*BIN of the bridge that replaced this bridge*)

    For example: REPLACED BY ALD

  - Item 7: REMOVED

- Other: This is intended to cover any feature/facility that is neither a highway facility open to the public nor one of the other categories listed above. The Feature/Facility Code **ABCDE** will be coded "OTHER". For bikeway facilities, provide the official name. For pedestrian bridges that are not part of a separate pedestrian path, specify PED and, followed by an @ (at) sign and the closest parallel street. For a building, provide the name of the building Some typical examples:

MINUTMN BKY	(bikeway facility)
PED@WEST ST	(pedestrian bridge)
STAR MKT	(building over a roadway)

9.5.3 Coding Item 6 and Item 7 for a Multiple Features/Facility

9.5.3.1 Hierarchy of Precedence for Multi Features/Facility

Generally, the following hierarchy of precedence will be used when entering information:

1) Interstates
2) US Numbered Routes

3) State Numbered Routes
4) Local Streets
5) Railroads
6) Rapid Transit Lines
7) Bodies of Water (rivers, streams, etc.)
8) Other (non-highway facilities or other information regarding a non-extant bridge)

9.5.3.2 Multiple Features/Facilities of the Same Type

- Roadways: Use the code for the feature/facility having the highest precedence in the above hierarchy. For features/facilities on the same segment of roadway, the descriptions shall follow all applicable conventions and will be entered in the hierarchy of precedence order with slashes separating each description. If no orientations are required, still provide a slash to indicate that the roadway is being shared. If there is also a local street name and space permits, enter this last separated by a slash (/).

  For example: I95 NB/ST128 NB
  ST 97/ST113
  ST110/ST111/AYER

  For features intersected on separate rights of way, the description for each right of way will follow all applicable conventions and will be entered in the hierarchy of precedence order with ampersands (&) separating the description of each right of way.

  For example: I93 NB&SERVC RD
  I95 /ST128&ACCS

- Railroads: If there are multiple users of the same set of tracks but only one owner, this is considered a single feature/facility. If there are two sets of tracks each of which is owned by a different entity, then code both the feature/facility code and description using the single feature/facility convention except that the two railroad names will be separated by an ampersand (&).

  For example: RR PARR & NECR

9.5.3.3 Multiple Features/Facilities of Different Types

Generally, this is only applicable for coding Item 6 and is used if two features of different types are intersected, such as a road and a river. The Feature/Facility Code **ABCD** will be coded "COMB" and **E** will be blank. Using all applicable conventions and the hierarchy of precedence, enter the each feature's description separated by an ampersand (&) from the others

For example: COMB W ORANGE RD&PARR
COMB PARR&HOOSIC RIV

9.5.4 Coding Items 63, 64, 65, and 66

If a bridge has a rating report or an addendum to a rating report that was specifically prepared with a Load Factor MS18 Inventory and Operating Rating for compliance with the FHWA 1995 Coding Guide, then Item 63 and 65 shall be coded "1" and the Inventory and Operating Ratings specified for Items 64 and 66 on the report's Summary Sheet shall be entered in Items 64 and 66.

If a bridge does not have a rating report or addendum specifically prepared with a Load Factor MS18 Operating Rating, but does have a rating report with an HS20 Inventory and Operating Rating in English Tons prepared using the Allowable Stress Method, then Item 63 and 65 shall be coded "2" and the English Ton HS20 Operating Rating from the report's Summary Sheet shall be multiplied by the 0.9 conversion factor (English to Metric Tons) specified by the FHWA National Bridge Inventory Information System (NBIS) October 1996 Metric Conversion Program to obtain an equivalent MS18 Inventory and Operating Ratings which will be entered in Item 64 and Item 66.

If a bridge has neither a rating report nor an addendum with a Load Factor MS18 Inventory and Operating Rating nor an Allowable Stress HS20 Inventory and Operating Rating, but does have a Rating Report with Inventory and Operating Ratings, obtained either by Allowable Stress numerical calculations or by Engineering Judgment, then Items 63, 64, 65 and 66 shall be coded as follows:

- NUMERICAL RATINGS:

  Item 63 and 65 shall be coded "2" and the largest Inventory (IR) and Operating Rating (OR) from the Rating Summary for either the H20, Type 3 or Type 3S2 trucks shall be converted to an approximate MS18 Inventory and Operating Rating, to be entered in Item 64 and 66, as follows:

  H Truck: Item 64 = OR x 1.25 (truck type conversion factor) x 0.9
  Type 3: Item 64 = OR x 1.0 (truck type conversion factor) x 0.9
  Type 3S2: Item 64 = OR x 0.7 (truck type conversion factor) x 0.9

  H Truck: Item 66 = IR x 1.25 (truck type conversion factor) x 0.9
  Type 3: Item 66 = IR x 1.0 (truck type conversion factor) x 0.9
  Type 3S2: Item 66 = IR x 0.7 (truck type conversion factor) x 0.9

  The truck type conversion factors are taken from the FHWA NBIS October 1996 Metric Conversion Program and are based on adjustment factors specified in the December 1988 FHWA Coding Guide.

- ENGINEERING JUDGMENT

  Item 63 and 65 shall be coded "5" and the Inventory and Operating Ratings for Items 64 and 66 shall be calculated as specified under Numerical Ratings above.

9.5.4.1 Design Ratings

If no rating report exists and the Department has determined that the structure is capable of carrying statutory loads based on the original Design Load Criteria shown on the plans, and its condition

at the time of consideration, then Item 63 and Item 65 shall be coded "5" and Item 64 shall be coded "**44.1**" and Item 66 shall be coded "32.4".

If a bridge was designed using the Load and Resistance Factor Design (LRFD) method and the HL-93 design loading, then Load and Resistance Factor Rating (LRFR) Rating Factors will need to be provided in order to comply with the FHWA NBIS Coding Guide for Item 64 and Item 66 . Items 63 and 65 shall be coded as an "8" to reflect the "LRFR Rating by RF method using HL-93". Item 64 and Item 66 shall have a rating factor greater of 1.0. This rating factor would mean that the structure has a capacity exceeding the design limits of the HL-93 design loading.

9.5.4.2 Closed Structures

If based on the results of a rating report, Item 63 and 65 shall be coded depending on the method of analysis; Item 64 and 66 shall be coded "**00.0**".

If based on the results of an inspection without any calculations, then Item 63 and 65 shall be coded "5"; Item 64 and 66 shall be coded "**00.0**".

For structures closed by the owner for non-structural reasons (the City and/or Town decides the roadway or bridge should be closed) Items 63, 64, 65, and 66 shall **not be changed**. If Items 64 and 66 are changed for the structure to "0.00", the structure would become structurally deficient and that may not accurately reflect its condition.

9.6 SECONDARY RECORDS

If the route(s) beneath the structure being inventoried in the primary record is (are) one of the following: Federal-aid highway, STRAHNET route or connector, or an otherwise important facility, a separate record known as the secondary record, also called an "under" record in the FHWA Coding Guide, must be created to inventory information regarding the route underneath the structure.

Each route on a separate roadway under the same structure will have a separate "under" record. This secondary record, along with the clearance information for when this route is "on" a bridge, allows FHWA to have a continuous record of clearances for this entire route.

Secondary records will be generated for all structures over these routes, whether or not they carry highways. Railroad bridges, pedestrian/bikeway bridges, buildings, etc., will only have a secondary record that is reported to the FHWA. The primary record for these structures will be included only in the Non-NBIS Inventory.

CREATION OF SECONDARY RECORDS

Area Bridge Inspection Engineers are responsible for the creation of the secondary records in the Bridge Inspection Management System (4D). STRAHNET routes are always considered to be of highest importance and are listed first, followed by Interstates, Principal Arterial, Minor Arterial, and Major or Urban Collector.

CODING THE SECONDARY RECORDS

For each of these secondary records, an additional Item 5 is created for inventory route identified as an "under" route. The Structure Number is identical to the primary record for the structure over the route.

CODING ITEMS FOR THE SECONDARY RECORDS

For each secondary record created, the following Items must be coded for the inventory route that is identified in Item 5 as an "under" inventory route:

Item 1
Items 3 through 11
Items 16 & 17
Items 19 & 20
Items 26 through 30
Items 42 & 43
Items 100 through 104
Items 109 & 110

Follow the coding directions in the FHWA Coding Guide for "under" records to properly code these items. Do not reverse the descriptions in Items 6 and 7 between the primary and secondary records. They must remain the same in the secondary record as in the primary record. Item 10 is coded for the minimum vertical clearance over the inventory route identified in Item 5, which, in the case of a secondary record, is the road below the structure.

9.7 MASSACHUSETTS SPECIFIC ITEMS

MassDOT has created its own specific Items to provide additional information that cannot be coded as part of the NBI inventory record but is nevertheless useful to have in the inventory. This information includes other identifying designations for the bridge, such as local names or alternate bridge numbers, to be used for cross reference purposes as well as information regarding the inspection and posting of this bridge.

Since these Items are not part of the NBI, they are referred to only by name and do not carry an Item number.

For easy reference, the following is a listing of all Massachusetts Specific Items. They have been grouped into the following subsection categories based on a common subject.

9.7.1 ACCESS ITEMS

Except for the ACCESS OTHER Item, all Access Items are a coded as two digit fields. The first field is intended to help bridge inspection personnel prepare for a bridge inspection by indicating the equipment and services needed to properly access and inspect a structure for all required types of inspection. The second field is used to track which equipment or service was actually used during each inspection. In addition to this 2 digit coding, the ACCESS OTHER Item has a 10 character field to permit a description of this access Item.

Since the first field for these Items is used for planning purposes and is not intended to indicate the equipment actually used, the coding for this field shall not change from inspection to inspection unless conditions at the bridge site change. A coding of "**Y**" indicates that this equipment or service is essential for proper access. A coding of "**P**" indicates that this equipment is not essential for proper access, however its use will facilitate or expedite the inspection and bridge inspection personnel should make an effort to secure its use. A coding of "**N**" indicates that no equipment or service is essential for proper access. However, the timely inspection of these bridges should not be delayed if this equipment is not available.

- Access Other

  This Item shall be coded by the District and has a 12 character field size. It denotes if an access item other than one of the ones listed below are required to properly access and inspect a structure for all types of inspection. Code this Item either **Y**, **N** or **P** for Field 1, **Y** or **N** for Field 2 and Describe the access item in Field 3 thru 12.

- Barge

  This Item shall be coded by the District and has a 2 character field size. A barge is needed to provide access for inspection. Code this Item either **Y**, **N** or **P** for Field 1 and **Y** or **N** for Field 2.

- Boat

  This Item shall be coded by the District and has a 2 character field size. A boat is needed to provide access for inspection. Code this Item either **Y**, **N** or **P** for Field 1 and **Y** or **N** for Field 2.

- Class A Emp

  This Item shall be coded by the District and has a 2 character field size. A Class A Employee from AMTRAK, qualified to provide protection from electrical hazards, is needed to provide access for inspection. Code this Item either **Y** or **N** for Field 1 and for Field 2.

- Confined Space

  This Item shall be coded by the District and has a 2 character field size. Confined space procedures, precautions and entry equipment are needed to provide access for inspection. Code this Item either **Y** or **N** for Field 1 and for Field 2.

- Ladder

  This Item shall be coded by the District and has a 2 character field size. A ladder is needed to provide access for inspection. Code this Item either **Y**, **N** or **P** for Field 1 and **Y** or **N** for Field 2.

- Lift Bucket

  This Item shall be coded by the District and has a 2 character field size. A Lift Bucket is needed to provide access for inspection. Code this Item either **Y**, **N** or **P** for Field 1 and **Y** or **N** for Field 2.

- Night/Off Hours Work

  This Item shall be coded by the District and has a 2 character field size. Access for inspection can only be obtained during night time or other off peak hours. Code this Item either **Y**, **N** or **P** for Field 1 and **Y** or **N** for Field 2.

- Police

  This Item shall be coded by the District and has a 2 character field size. A police detail is required to provide access for inspection. Code this Item either **Y**, **N** or **P** for Field 1 and **Y** or **N** for Field 2.

- Railroad Flagging

  This Item shall be coded by the District and has a 2 character field size. Railroad flagging is required to provide access for inspection. Code this Item either **Y**, **N** or **P** for Field 1 and **Y** or **N** for Field 2.

- Rigging

  This Item shall be coded by the District and has a 2 character field size. Rigging is needed to provide access for inspection. Code this Item either **Y**, **N** or **P** for Field 1 and **Y** or **N** for Field 2.

- Snooper

  This Item shall be coded by the District and has a 2 character field size. The Snooper is needed to provide access for inspection. Code this Item either **Y**, **N** or **P** for Field 1 and **Y** or **N** for Field 2.

- Traffic Control

  This Item shall be coded by the District and has a 2 character field size. A traffic control set up is needed to provide access for inspection. Code this Item either **Y**, **N** or **P** for Field 1 and **Y** or **N** for Field 2.

- Wader

  This Item shall be coded by the District and has a 2 character field size. Waders are needed to provide access for inspection. Code this Item either **Y**, **N** or **P** for Field 1 and **Y** or **N** for Field 2.

9.7.2 BRIDGE FEATURES

- Foundation Type

  This Item shall be coded by Boston and has a 1 character field size. This Item is used to indicate the type of foundation that the bridge has been designed with. The information should be taken from the plans, or if there are no plans available, then from the results of any investigation

performed to establish the foundation type. If there is no information regarding the foundation type, the coding should be X - Unknown Foundation. If there is a mixture of foundation types, then the coding should be for the type of foundation of the majority of substructure units. This Item is coded as follows:

A Spread Footings on Soil
B Spread Footings on Ledge
C Pipe Piles
D H-Piles
E Concrete Piles
F Timber Piles
G Drilled Shafts
H Mini-Piles
X Unknown Foundation

- Jointless Bridge

This Item shall be coded by Boston and has a 1 character field size. This Item is used to indicate the type of jointless construction that the bridge has been designed with. Jointless bridges are those bridges that do not have a roadway joint between the superstructure and the abutment backwall. Integral abutment bridges are those bridges whose beams are embedded in a stub abutment stem, which extends up to and is tied into the deck pour. Integral abutments, although typically founded on piles, may also be on spread footings. Semi-Integral abutments are those that have a horizontal joint between the abutment seat and the superstructure to allow for movement, but the beam ends are embedded in a monolithic end diaphragm that extends to and is tied into the deck pour. Rigid frame bridges have a full moment connection between the superstructure and the full height abutment walls, thereby forming a moment frame. This Item is coded as follows:

A INTEGRAL (strong axis H-piles)
B INTEGRAL (weak axis H-piles)
C INTEGRAL (pipe piles)
D INTEGRAL (concrete piles)
E INTEGRAL (timber piles)
F INTEGRAL (spread footings)
G INTEGRAL (cantilevered end span)
H SEMI-INTEGRAL (piles)
I SEMI-INTEGRAL (spread footings)
J RIGID FRAME
X Not applicable (Not a Jointless Bridge)

- Overhead Signs

This Item shall be coded by the District and has a 1 character field size. This Item indicates whether or not a bridge has an overhead traffic sign attached to it. Code this Item either **Y or N** if there is an overhead sign.

- Pier Type

  This Item shall be coded by the District and has a 2 character field size. This Item is used to provide information regarding the bridge's piers, if any. The first character denotes the type of material used in the pier's construction and the second character denotes the type of pier. This information can be taken either from the plans or from a field inspection. If the bridge is a mixture of pier types or pier materials, then the coding should be for the predominant pier type and the material used in its construction.

  The first character denotes the type of material used in the pier's construction and is coded as follows:

  A Concrete
  B Steel
  C Timber
  D Masonry
  E Other
  N No pier

  The second character denotes the type of pier and is coded as follows:

  A Single column pier
  B Hammerhead pier (Single column with cantilevered pier cap ends)
  C Two column frame
  D Multi column pier, without pier caps
  E Multi column pier, with pier cap
  F Multi column pier on top of railroad crash wall
  G Wall pier
  H Pile bent
  I Integral with arch superstructure
  J Integral with culvert superstructure
  K Other
  N No pier

- Pin & Hanger

  This Item shall be coded by the District and has a 1 character field size. This Item indicates whether or not a bridge has pin & hanger details as part of its superstructure construction. Code this Item either **Y** if there are pin & hanger details or **N** if there are no pin & hanger details.

- Protective Screen

  This Item shall be coded by the District and has a 1 character field size. This Item indicates whether or not a bridge has an anti-missile fence. A Protective Screen fence is an anti-missile which is erected on the side of a bridge or attached to the bridge railing to prevent debris from being dropped or thrown from the bridge onto the road or railroad below. An anti-missile screen should have a minimum height of 8' - 9" (2.66 meters) from the top of sidewalk or roadway (if no sidewalk) and should have a mesh, such as chain link, with openings which will prevent an object

greater than 2 inches (50 mm) from passing through. The top of the fence need not be curved to be considered an anti-missile fence. Code this Item either **Y or N** if there is an anti missile fence.

- Snow Fence

  This Item shall be coded by the District and has a 1 character field size. This Item indicates whether or not a snow fence is installed across the bridge. Code this Item either **Y** if there is a snow fence or **N** if there is no snow fence.

- Steel Coating

  This Item shall be coded by the District and has a 1 character field size. This Item indicates the type of coating system used for the structural steel. Code this Item as follows:

  G **Galvanized**
  M **Metalized**
  P **Painted**
  W **Weathering Steel**
  O **Other Coating System**

- Temporary Bridge

  This Item shall be coded by the District and has a 1 character field size. This Item indicates the existence and type of temporary bridge that carries traffic in place of the permanent bridge. This Item will indicate only those temporary bridges which are positioned in the exact same location as the permanent bridge which the temporary bridge functionally replaces. The temporary bridge may be located over the permanent bridge or in place of the permanent bridge, if it has been removed. This Item will not indicate temporary bridges that are located on a separate alignment from that of the permanent bridge. Code this Item as follows:

  N if there is no temporary bridge
  A if the temporary bridge is an ACROW Panel Bridge
  M if it is a Mabey Bridge
  P if it is a commercially available pre-engineered bridge
  O if it is any other type of temporary bridge

  A temporary bridge shall be considered a permanent bridge if it remains in place for more than 5 years and a new replacement bridge is not programmed for design and construction. When this becomes the case, the NBI inventory shall be updated with all pertinent data of this formerly temporary bridge structure, and this Item shall be coded "**N**".

- Utilities

  This Item shall be coded by the District and has a 1 character field size for each appropriate utility type. Code this Item either **Y or N** for each utility type that exists on a structure's superstructure. This Item will indicate the presence and type of utility present and carried or supported by the structure's superstructure. The types of utilities that a structure's superstructure may carry or support are as follows:

- Water Line
- Sewer Line
- Natural Gas Line
- Electrical Conduit Lines
- Communication Conduit or Lines

9.7.3 CLEARANCE INFORMATION

- Posted for Vertical Clearance

  This Item shall be coded by the District and has a 1 character field size. This Item indicates whether or not this bridge has a vertical clearance posting. Code this Item either **Y or N** if there is a vertical clearance posting.

- N/E Vertical Clearance Measured

  This Item shall be coded by the District and has a 4 character field size. This Item is the minimum vertical clearance under a bridge over the Northbound or Eastbound roadway as measured in English Units. If this is the controlling clearance for the bridge, the clearance measurement provided under this Item is the English Unit conversion of the metric unit clearance coded in Item 54 of the FHWA Coding Guide. This Item is intended to be used by the inspectors to more easily verify the existing vertical clearance posting signs at a bridge without having to do unit conversions in the field. This Item is coded in feet and inches, **FFII**, where **FF** is the foot component of the clearance and **II** is the inch component of the clearance. The inch dimension should be rounded down to the nearest inch.

- N/E Vertical Clearance Posting

  This Item shall be coded by the District and has a 4 character field size. This Item is the vertical clearance over the Northbound or Eastbound roadway in English Units for which the bridge is actually posted. This Item is coded in feet and inches, **FFII**, where **FF** is the foot component of the clearance and **II** is the inch component of the clearance. The inch dimension should be rounded down to the nearest inch.

- S/W Vertical Clearance Measured

  This Item shall be coded by the District and has a 4 character field size. This Item is the minimum vertical clearance under a bridge over the Southbound or Westbound roadway as measured in English Units. If this is the controlling clearance for the bridge, the clearance measurement provided under this Item is the English Unit conversion of the metric unit clearance coded in Item 54 of the FHWA Coding Guide. This Item is intended to be used by the inspectors to more easily verify the existing vertical clearance posting signs at a bridge without having to do unit conversions in the field. This Item is coded in feet and inches, **FFII**, where **FF** is the foot component of the clearance and **II** is the inch component of the clearance. The inch dimension should be rounded down to the nearest inch.

- S/W Vertical Clearance Posting

  This Item shall be coded by the District and has a 4 character field size. This Item is the vertical clearance over the Southbound or Westbound roadway in English Units for which the bridge is actually posted. This Item is coded in feet and inches, **FFII**, where **FF** is the foot component of the clearance and **II** is the inch component of the clearance. The inch dimension should be rounded down to the nearest inch.

- Truss Portal Measured

  This Item shall be coded by the District and has a 4 character field size. This Item is the vertical clearance over the roadway at the truss portal in English Units. This Item is coded in feet and inches, **FFII**, where **FF** is the foot component of the clearance and **II** is the inch component of the clearance. The inch dimension should be rounded down to the nearest inch. Truss portals are another situation that may require clarification by signing the low point location to alert the driver of where the clearance is the lowest along the roadway. Refer to Section 4.8 for further discussion.

9.7.4 CULVERT ITEMS

The following Items are used to inventory a culvert structure and are found on the Routine Culvert Inspection form.

- Barrel Height

  This Item shall be coded by the District and has a 5 character field size. This Item is the largest vertical dimension of the typical culvert barrel opening. If the culvert is composed of barrels of different sizes, use the largest opening. This Item is coded in meters and hundredths of a meter as **XX.XX.**

- Barrel Number

  This Item shall be coded by the District and has a 2 character field size. It indicates the number of barrels that make up the culvert structure.

- Barrel Width

  This Item shall be coded by the District and has a 5 character field size. This Item is the largest horizontal square dimension of the typical culvert barrel opening. If the culvert is composed of barrels of different sizes, use the largest opening. This Item is coded in meters and hundredths of a meter as **XX.XX**.

- Culvert Coating

  This Item shall be coded by the District and has a 20 character field size. A text field used to enter a description of the type of protective coating applied to the culvert.

- Culvert Material

  This Item shall be coded by the District and has a 40 character field size. A text field used to enter a description of the material that the culvert is made from. The description should be consistent with the material specified in Item 43 but should try to be more descriptive, for example: reinforced concrete, corrugated aluminum, corrugated steel, etc.

- Culvert Shape

  This Item shall be coded by the District and has a 20 character field size. A text field used to enter a description of the shape of the culvert. Typical descriptions are: rectangular, round, elliptical.

- Depth of Cover

  This Item shall be coded by the District and has a 4 character field size. This Item is the average depth of cover over the culvert, rounded to the nearest tenth of a meter. This Item is coded in decimal meters as **XX.X**.

9.7.5 INVENTORY ITEMS

- Agency Bridge #

  This Item shall be coded by Boston and has a 9 character field size. If a bridge is owned by another state agency or other political entity which uses a bridge numbering scheme different from the MassDOT bridge numbers, this internal agency bridge number is recorded here for cross reference purposes.

- BDEPT #

  This Item shall be coded by Boston and has a 6 character field size. BDEPT# is a 6 character alphanumeric used to identify a specific crossing of a transportation facility over a depression or obstruction(s) by means of a bridge structure(s). BDEPT#'s are assigned to both highway and non-highway facilities. The first 3 characters are the city/town code and the last 3 characters are the sequential serial number within the city/town assigned to the bridge. Although the BDEPT# is a part of the FHWA Coding Guide Item 8, it is also used as a Massachusetts Specific Item for reference purposes.

  City/Town Code: Use the 3 digit City/Town Code for BDEPT# from the table in Attachment 9-1 for the city/town in which the bridge is located. The first character of this code is the first letter of the city/town name and the second and third characters are the city/town position on a statewide alphabetical list of all cities/towns beginning with the same letter.

  Sequential Serial Number: Assigned by the Data Control Unit. This number starts from 001 and increases sequentially. Each new BDEPT# is assigned the next unreserved number in the sequence.

  NOTE: There are four missing city/town codes in the city/town codes sequence. These missing codes were the ones for the towns of Dana (D02), Enfield (E09), Greenwich (G13) and Prescott (P15), which were abandoned and flooded to create the Quabbin Reservoir.

- BIN

  This Item shall be coded by Boston and has a 3 character field size. The BIN, or Bridge Identification Number, is a computer generated 3 digit alphanumeric that is assigned to uniquely and permanently identify a bridge inventory record for every bridge structure in the state. All bridge inventory records, including agencies, railroads, private bridges, etc., have an assigned BIN. The BIN, once assigned to a record, cannot be deleted or modified, and so can be used to identify inventory records for bridges that have been demolished. The BIN uses the letters **A** through **Z** (excluding the letters **O, I, Z** and **S**) and the numerals **0** through **9**.

  Although the BIN is a part of the FHWA Coding Guide Item 8, it is also used as a Massachusetts Specific Item for reference purposes. All bridge references must include the BIN. For example, Bridge No. A13015 (0FK).

- Bridge Category Code

  This Item shall be coded by the Boston and has a 3 character field size. The Bridge Category Code is a three character alphanumeric code which identifies the category that the bridge falls into. This code is used primarily to distinguish between bridges that belong on the National Bridge Inventory (i.e. that meet the NBIS definition of a bridge) and those that belong on the Non-NBIS Inventory of Bridges. In the case of the Non-NBIS Inventory, this code is used to distinguish bridges based on the type of facility carried by the bridge. Although the Bridge Category Code is a part of the FHWA Coding Guide Item 8, it is also used as a Massachusetts Specific Item for reference purposes. A complete listing of Bridge Category Codes is found in the description of Item 8 in Section 9.5.

- Bridge Name

  This Item shall be coded by the Boston and has a 30 character field size. Record the official local name of the bridge or officially dedicated memorial name of the bridge.

- Bridge Key

  This Item was coded by both the District and Boston and had a 12 character field size. The BRKEY, or Bridge Key #, was a 12 character alphanumeric field that was assigned to a bridge structure (or part of a structure) for precise identification. The Bridge Key # is no longer used and is referenced here for historical purposes.

  The BRKEY was used to distinguish between bridge structures that have the same BDEPT#. The BRKEY was also used to divide up a multi-span bridge or viaduct for inspection or maintenance identification purposes. Logically, this would be done using existing, readily identifiable features, such as expansion joints, changes in the structure type, or where the deck geometry changes.

  For reference, the BRKEY was coded in the following sequence:

  ABCDEFGHIJKL

Where:

ABC is the owner and/or facility carried on the bridge code
DEF is the city/town code
GHI is an unique bridge number used for identification
JKL is the directionality/route classification indicator

CODING ABC:

MassDOT OWNED NBIS BRIDGES: **ABC** is a three digit number coded depending on the functional classification of the route the bridge is on:

Federal Aid Primary	001-099
Federal Aid Secondary	100-399
Federal Aid - Other	400-799
Miscellaneous	800-999

Except that the following codes are reserved to identify interstate and Chapter 634 bridges:

086	=	I-84	091	=	I-91	096	=	I-495
087	=	I-395	092	=	I-291	097	=	I-195
088	=	I-895	093	=	I-93	098	=	I-295
089	=	I-391	094	=	I-290	099	=	I-190
090	=	I-90	095	=	I-95	900	=	Chapt. 634

NOTE: 1) I-84 was originally numbered I-86, hence the code.
2) I-895 was to be the Boston Inner Belt which was never built.
3) A Chapter 634 bridge is a highway bridge over a railroad whose ownership was transferred to the MassDOT under Chapter 634 of the Acts of 1971.

NON-NBIS BRIDGES REGARDLESS OF OWNER: **ABC** is one of the following alphabetic codes, except when the owner is another state agency in which case the agency code is used instead (see the NON-MassDOT OWNED NBIS OR NON-NBIS BRIDGES for the codes of these state agencies).

These structures may or may not be owned by MassDOT:

BRI A bridge under Massachusetts law which carries a highway: any structure with a span over 10 feet (3.05 meters) measured along the centerline or 8 feet (2.44 meters) measured square to the abutments but less than or equal to 20 feet (6.1 meters) measured along the centerline.
BKY Bikeway bridge.
CUL Any highway structure with a span less than 8 feet (2.44 meters), measured square to the abutments, but greater than 4 feet (1.22 meters), provided that no opening or pipe diameter comprising the structure measures less than 4 feet (1.22 meters).
DUM "Dummy" Record denoting an inventory record for: 2nd town of a town line bridge.

DRE A bridge structure that has been physically removed but whose inventory record is being retained as a historic record for archive purposes.
PED Pedestrian bridge.
RRO Railroad bridge (other than MBTA owned).

NON-MassDOT OWNED NBIS OR NON-NBIS BRIDGES: **ABC** is one of the following alphabetic codes. These structures are not owned by MassDOT:

BLD Building over a highway
DEM Department of Environmental Management
FED Owned by any Federal Agency not specifically listed
MDC Metropolitan District Commission
MPA Massachusetts Port Authority
MTA Massachusetts Turnpike Authority
MUN City/Town owned bridge on a Federal Aid System
PRI Privately owned bridge
TEE Any MBTA structure. This code can be refined as follows:

TEC MBTA owned CUL
TEH MBTA owned NBIS bridge
TEB MBTA owned BRI bridge
TET MBTA owned transit bridge
TED MBTA owned drawbridge
TER MBTA owned railroad bridge
TEP MBTA owned pedestrian bridge

TWN City/Town owned "off-system" bridge (i.e. not on a Federal Aid System)
UTL Bridge carrying only utility(ies)
WRA Water Resources Authority

OTHER CATEGORY REGARDLESS OF OWNER: **ABC** is one of the following alphabetic codes. These structures may or may not be owned by MassDOT:

CAN Temporary CANA Ramps
DES A record used to reserve a BDEPT# and/or BIN for a new bridge currently under design.
CLO A bridge that has been permanently closed with no access allowed.
CLP A bridge that has been permanently closed with pedestrian access allowed.

CODING DEF: Use the 3 digit City/Town Code for BRKEY from the table in Appendix 9-1 for the city/town in which the bridge was located.

CODING GHI: A unique 3 digit identification number used to precisely identify each bridge structure within a city/town for inspection or maintenance purposes. For some bridges, this number is identical to the last 3 digits of the BDEPT#. For other bridges, this is an independent number generated by the District Bridge Inspection Unit or Structures Maintenance Unit to distinguish bridges structures with the same BDEPT# or to divide up a multi-span bridge or viaduct.

STRUCTURES WHERE **ABC** IS CODED BRI, BKY, CUL, CLO, CLP, PED, BLD: **GHI** will be coded as follows:

OWNER	**G**	**HI**
City/Town	T	Unique number
MassDOT	S	Unique number
Army COE	A	Unique number
DEM	D	Unique number
Federal	F	Unique number
MDC	P	Unique number
MTA	M	Unique number
RR (other than MBTA)	R	Unique number
Private	Z	Unique number

DIVIDING UP A MULTI-SPAN BRIDGE OR VIADUCT: A logical sequence should be employed so that the individual structures that make up the overall bridge can be easily identified. An example of such a sequence can be as follows:

G	=	N	For structures on the NB Roadway
G	=	S	For structures on the SB Roadway
G	=	E	For structures on the EB Roadway
G	=	W	For structures on the WB Roadway
G	=	B	For structures carrying bidirectional traffic
HI	=	00 thru 99	For Mainline Structures
H	=	R	For Ramp
I	=	Letter A to Z	For Ramps

All structures should be coded sequentially according to the established survey and kilometer numbering direction for the inventory route.

CODING JKL: A 3 digit number to be coded as follows:

J 0 until all inventory coding for the structure is completed, then 1

K Directional Indicator
0 = Two-way traffic
1 = North bound
2 = East bound
3 = South bound
4 = West bound

L For primary records: 0 for unnumbered route; 1 for numbered route.

- Facility Carried by Structure

This shall be coded by District and Boston and has no character field size restriction. The complete street name or roadway segment will be inputted in this field. This will be used for the purpose of writing letters to the cities and towns.

- Features Intersected

  This shall be coded by District and Boston and has no character field size restriction. The complete name of the feature being crossed will be inputted in this field. This will be used for the purpose of writing letters to the cities and towns.

- FC Under

  This Item was coded by Boston and has a 2 character field size. The Functional Classification of the road underneath the structure. The two digits of this Item will be coded using the same two digit code as for FHWA Coding Guide Item 26.

- FHWA Record

  This Item was coded by both the District and Boston and has a 1 character field size. This Item denotes if the inventory record for this bridge belongs on the National Bridge Inventory or not. It is used to distinguish between NBI bridges and Non-NBIS bridges, such as BRI's, closed bridges, demolished bridges, non-highway bridges, etc. The purpose of this Item is to determine which inventory records are to be sent to the FHWA in Washington DC and which are not. The District shall be responsible for coding this Item, however, the Area Bridge Inspection Engineers in the Boston Headquarters have the ability to recode this Item based on their review of the inventory information. The District shall be informed of the reason for any such changes. Code this Item a **Y** if the bridge belongs in the NBI and a **N** if it belongs in the Non-NBIS inventory.

- Legacy Owner

  This Item shall be coded by Boston and has a 3 character field size. On November 1, 2009, the new Massachusetts Department of Transportation was created and the ownership of the bridges of the former Massachusetts Highway Department and the Massachusetts Turnpike Authority along with most of the highway bridges of the Department of Conservation and Recreation and the Tobin Bridge of MassPort was transferred to the MassDOT Highway Division. The Legacy Owner is a three character alphabetic code, which identifies the owner of the bridge prior to it becoming a MassDOT bridge, since these bridges are now coded DOT in the FHWA Coding Guide Item 8. In addition to the listing of Owner Codes found in the description of Item 8 in Section 9.5, the following Legacy Owner code that are no longer used as Owner Codes in Item 8:

CAN	Temporary CANA Ramps
MHD	Massachusetts Highway Department
MHS	Metropolitan Highway System
MTA	Massachusetts Turnpike Authority

- Mile Marker

  This Item shall be coded by the District and has a 5 character field size. If a mile marker is posted on or at the bridge then record the value posted. If the mile marker is not posted but is easily estimated from adjacent mile posts then provide the estimated mile marker rounded to the tenth of a mile.

- Owner Code

  This Item shall be coded by Boston and has a 3 character field size. The Owner Code is a three character alphabetic code which identifies the owner of the bridge, either specifically, as is the case with bridges owned by major state agencies, or generically, as is the case with bridges owned by cities or towns. Although the Owner Code is a part of the FHWA Coding Guide Item 8, it is also used as a Massachusetts Specific Item for reference purposes. A complete listing of Owner Codes is found in the description of Item 8 in Section 9.5.

- Parallel BIN

  This Item shall be coded by the District and has a 3 character field size. This Item records the BIN of the structure on a divided highway which is parallel to the structure being inventoried.

- Railroad Branch

  This Item shall be coded by Boston and has a 20 character field size. This records, for cross reference purposes, the official name that the railroad company uses to identify the rail line under the bridge.

- Railroad Bridge #

  This Item shall be coded by Boston and has a 6 character field size. Railroad companies identify bridges, both railroad bridges and highway bridges over the railroad, by their milepoint location, to the nearest hundredth of a mile, on the particular railroad line's mile post sequence. The railroad company's bridge number is recorded here for cross reference purposes.

  Although the bridge number is typically painted on the bridge structure, this cannot always be assumed to be correct, since some railroads have changed their mile post numbering sequences in recent years with changes in ownership. Always reference the railroad's company's latest track chart for the correct railroad bridge number for a given bridge.

- Town Line BDEPT #

  This Item shall be coded by Boston and has a 6 character field size. A 6 character alphanumeric indicating the BDEPT# for the secondary town of a town line bridge.

- Town Name

  This Item shall be coded by Boston and has a 20 character field size. The name of the city/town in which the bridge structure is located.

9.7.6 INSPECTION ITEMS

- Closed Bridge Inspection Date

  This Item shall be coded by the District and has a 4 character field size. This is a 4 digit number used to record the month and year of the latest Closed Bridge Inspection. For coding, follow the FHWA Coding Guide instructions for coding Items 93A, 93B, and 93C.

- Closed Bridge Inspection Frequency

  This Item shall be coded by the District and has a 3 character field size. This is a 3 character alphanumeric used to indicate the need for a Closed Bridge Inspection and its frequency. For coding, follow the FHWA Coding Guide instructions for coding Items 92A, 92B and 92C.

- Complex Bridge

  This Item is coded by Boston and has a 1 character field size. The Item denotes if this bridge has been identified as a Complex Bridge for inspection purposes. Complex Bridges are assigned for inspection to one of the Complex Bridge Inspection Consultant Contracts. Generally it would be a bridge with one or more non-typical features such as: complex structural details; movable bridge elements; difficult inspection access; or requiring extensive time to inspect. Code this Item a **Y** if it is a complex bridge or an **N** = if it is not a complex bridge.

- Damage Inspection

  This Item shall be coded by the District and has a 4 character field size. This is a 4 digit number used to record the month and year of the last Damage Inspection. For coding, follow the FHWA Coding Guide instructions for coding Items 93A, 93B, and 93C.

- Inspection Hours

  This Item shall be coded by the District and has a 3 character field size. This is a three digit numerical Item which records the number of person hours required to inspect the structure for a ROUTINE inspection, including FRACTURE CRITICAL inspection, if applicable and to complete the inspection report. This number of hours should include time for the review of plans, previous inspection reports, rating books, etc., in preparation for the inspection as well as an estimate of travel time from the central bridge inspection office, time for writing reports and time for data entry.

- Inspection Responsibility

  This Item shall be coded by both the District and Boston and has a 5 character field size. The District or Agency responsible for inspecting this bridge is entered in this Item according to the following code:

DCR	Department of Conservation and Recreation
DIST1	District 1
DIST2	District 2

DIST3	District 3
DIST4	District 4
DIST5	District 5
DIST6	District 6
MBTA	Massachusetts Bay Transportation Authority
MPA	Massachusetts Port Authority
COE	Army Corps of Engineers
FED	Federal Agency
RR	Rail Road

The District shall code the MassDOT information. The Boston Headquarters shall code the Agency and Railroad information.

- Inspection Waiver

  This Item shall be coded by Boston and has a 1 character field size. Indicates that the continued inspection of the bridge on the required frequency for any inspection has been waived. For example, the Handbook specified frequency of a SPECIAL MEMBER inspection based on the condition of a bridge member is waived because the member, even in its deteriorated state, can still safely carry the posted load. Code this Item a **Y** if frequency has been waived and a **N** if frequency has not been waived

- Inspection Waiver Remarks

  This Item shall be coded by Boston and has a 200 character field size. Records inspection type whose frequency is being waived and the basis for the waiver.

- Other Inspection

  This Item is coded by the District and has a 3 character field size.

- Underwater Inspection:

  This Item is coded by Boston and has a 3 character field size.

9.7.7 LOAD RATING INFORMATION

The following Items are used to record load ratings taken from the Summary Sheet of the bridge's rating report.

- INV H20

  This Item shall be coded by Boston and has a 2 character field size. The Inventory Rating weight limit for the H truck for which the bridge is rated, as stated on the rating report Summary Sheet for this bridge. This Item is coded **NN**, where **NN** denotes the Inventory Rating in English Tons.

- INV TYPE 3

  This Item shall be coded by Boston and has a 2 character field size. The Inventory Rating weight limit for the Type 3 truck for which the bridge is rated, as stated on the rating report Summary Sheet for this bridge. This Item is coded **NN**, where **NN** denotes the Inventory Rating in English Tons.

- INV TYPE 3S2

  This Item shall be coded by Boston and has a 2 character field size. The Inventory Rating weight limit for the Type 3S2 truck for which the bridge is rated, as stated on the rating report Summary Sheet for this bridge. This Item is coded **NN**, where **NN** denotes the Inventory Rating in English Tons.

- INV HS

  This Item shall be coded by Boston and has a 2 character field size. The Inventory Rating weight limit for the HS truck for which the bridge is rated, as stated on the rating report Summary Sheet for this bridge. This Item is coded **NN**, where **NN** denotes the Inventory Rating in English Tons.

- OPR H20

  This Item shall be coded by Boston and has a 2 character field size. The Operating Rating weight limit for the H truck for which the bridge is rated, as stated on the rating report Summary Sheet for this bridge. This Item is coded **NN**, where **NN** denotes the Operating Rating in English Tons.

- OPR TYPE 3

  This Item shall be coded by Boston and has a 2 character field size. The Operating Rating weight limit for the Type 3 truck for which the bridge is rated, as stated on the rating report Summary Sheet for this bridge. This Item is coded **NN**, where **NN** denotes the Operating Rating in English Tons.

- OPR TYPE 3S2

  This Item shall be coded by Boston and has a 2 character field size. The Operating Rating weight limit for the Type 3S2 truck for which the bridge is rated, as stated on the rating report Summary Sheet for this bridge. This Item is coded **NN**, where **NN** denotes the Operating Rating in English Tons.

- OPR HS

  This Item shall be coded by Boston and has a 2 character field size. The Operating Rating weight limit for the HS truck for which the bridge is rated, as stated on the rating report Summary Sheet for this bridge. This Item is coded **NN**, where **NN** denotes the Operating Rating in English Tons.

9.7.7.1 Load Rating Values for "DESIGN" Status

If the Department has determined that a structure is capable of carrying statutory loads based on the original Design Load Criteria shown on the plans and its condition at the time of consideration, then the following shall be coded as shown:

OPR H20 =27	INV H20=20
OPR TYPE 3=34	INV TYPE 3=25
OPR 3S2=49	INV 3S2=36
OPR HS=49	INV HS=36

Guidance for coding the Posting Status and Posting date is contained in Section 9.7.9.

9.7.7.2 Load Rating Values for Inventoried Structures with Unknown Design Load Criteria (no plans)

If a structure is inventoried and plans do not exist that define what the original structures Design Load Criteria, then based on the structure's condition at the time of consideration and the fact that the structure has been carrying statutory loads, then the following shall be coded as shown:

OPR H20 =27	INV H20=20
OPR TYPE 3=34	INV TYPE 3=25
OPR 3S2=49	INV 3S2=36
OPR HS=49	INV HS=36

Guidance for coding the Posting Status and Posting date is contained in Section 9.7.9.

9.7.8 MAINTENANCE INFORMATION

- Year Painted

  This Item shall be coded by the District and has a 4 character field size. This Item denotes the year when the bridge was last painted.

- Year Rehabbed

  This Item shall be coded by the District and has a 4 character field size. This Item denotes the year when any maintenance or rehabilitation work, other than that specified under Item 106, was performed on the bridge. If the work qualifies under Item 106, do not enter that date again in this Item.

9.7.9 POSTING INFORMATION

The following Items are used to record the recommended posting for a bridge in accordance with Section 6.7.1 of this Handbook as well as the actual posting as recorded from the posting sign at the bridge.

- Actual 2 Axles

  This Item shall be coded by the District and has a 2 character field size. The weight limit for a 2 axle truck for which the bridge is actually posted. This Item is coded **NN**, where **NN** denotes the posting for the two axle truck on the posting sign in English Tons.

- Actual 3 Axles

  This Item shall be coded by the District and has a 2 character field size. The weight limit for a 3 axle truck for which the bridge is actually posted. This Item is coded **NN**, where **NN** denotes the posting for the three axle truck on the posting sign in English Tons.

- Actual 5 Axles

  This Item shall be coded by the District and has a 2 character field size. The weight limit for a 5 axle truck for which the bridge is actually posted. This Item is coded **NN**, where **NN** denotes the posting for the five axle truck on the posting sign in English Tons.

- Posting Date

  This Item shall be coded by Boston and has a 10 character field size. Coded as follows:

  MM/DD/YYYY (with slashes) where

  MM denotes the month
  DD denotes the day
  YYYY denotes the year

  The POSTING DATE shall be coded as defined in Section 6.7.1, or as otherwise stated below.

  For structures with a posting status of DESIGN, the Posting Date is the "date of the Design Year Built".

  For structures being added to the inventory and no plans exist, posting status is EJDMT (Engineering Judgment), the Posting Date is the "date of year built". This date is typically taken off the endpost. If no endpost date exists, then an assumed date will be entered after the Bridge Inspection Engineer has been consulted.

- Posting Remarks

  This Item shall be coded by Boston and has a 40 character field size. Records any relevant comments about the actual posting of the bridge. For example, if a municipality posts the bridge for less than the posting recommended or if the posting for this bridge is controlled by another bridge on the same stretch of road.

- Posting Status

  This Item shall be coded by Boston and has a 6 character field size. The POSTING STATUS shall be coded as defined in Section 6.7.1, or as otherwise stated below.

  The following are the only valid codes for this Item:

POSTED	LEGAL
EJDMT	DESIGN
WAIVED	CLOSED

  DESIGN status is used generally used as a place holder for bridges recently built or reconstructed. This status remains in place until a numerical rating report is produced and accepted.

  EJDMT status will also be used when a recently inventoried structure is added and no plans exist which define the Design Load Criteria. This status remains in place until a numerical rating report is produced and accepted.

- Recommended 2 Axles

  This Item shall be coded by Boston and has a 2 character field size. The weight limit for a 2 axle truck for the bridge as recommended in the Bridge Engineer's Memo to the NBIS File. This Item is coded **NN**, where **NN** denotes the recommended posting for the two axle truck in English Tons.

- Recommended 3 Axles

  This Item shall be coded by Boston and has a 2 character field size. The weight limit for a 3 axle truck for the bridge as recommended in the Bridge Engineer's Memo to the NBIS File. This Item is coded **NN**, where **NN** denotes the recommended posting for the three axle truck in English Tons.

- Recommended 5 Axles

  This Item shall be coded by Boston and has a 2 character field size. The weight limit for a 5 axle truck for the bridge as recommended in the Bridge Engineer's Memo to the NBIS File. This Item is coded **NN**, where **NN** denotes the recommended posting for the five axle truck in English Tons.

9.8 CHAPTER 9 ATTACHMENTS

CITY/TOWN	CITY/TOWN CODES For BDEPT#	Present District #	Previous District #	PLACE	COUNTY
Abington	A01	5	7	00170	023
Acton	A02	3	4	00380	017
Acushnet	A03	5	6 (7)	00520	005
Adams	A04	1	1	00555	003
Agawam	A05	2	2	00800	013
Alford	A06	1	1	00975	003
Amesbury	A07	4	5	01185	009
Amherst	A08	2	2	01325	015
Andover	A09	4	5 (4)	01465	009
Arlington	A10	4	4	01605	017
Ashburnham	A11	3	3	01885	027
Ashby	A12	3	4	01955	017
Ashfield	A13	1	2	02095	011
Ashland	A14	3	4	02130	017
Athol	A15	2	3 (2)	02480	027
ATTLEBORO	A16	5	6	02690	005
Auburn	A17	3	3	02760	027
Avon	A18	5	6	02935	021
Ayer	A19	3	4	03005	017
Barnstable	B01	5	7	03635	001
Barre	B02	2	3	03740	027
Becket	B03	1	1	04545	003
Bedford	B04	4	4	04615	017
Belchertown	B05	2	2	04825	015
Bellingham	B06	3	6	04930	021
Belmont	B07	4	4	05070	017
Berkley	B08	5	6	05280	005
Berlin	B09	3	3 (4)	05490	027
Bernardston	B10	2	2	05560	011
BEVERLY	B11	4	5	05595	009
Billerica	B12	4	4	05805	017
Blackstone	B13	3	3 (6)	06015	027
Blandford	B14	1	1	06085	013
Bolton	B15	3	3 (4)	06365	027
BOSTON	B16	6	4 (8) (6)	07000	025
Bourne	B17	5	7	07175	001
Boxborough	B18	3	4	07350	017
Boxford	B19	4	5	07420	009
Boylston	B20	3	3	07525	027
Braintree	B21	6	4 (6)	07665	021
Brewster	B22	5	7	07980	001
Bridgewater	B23	5	7 (6)	08085	023
Brimfield	B24	2	3	08470	013
BROCKTON	B25	5	7 (6)	09000	023
Brookfield	B26	3	3	09105	027
Brookline	B27	6	4 (8) (4)	09175	021
Buckland	B28	1	2	09595	011
Burlington	B29	4	4	09840	017
CAMBRIDGE	C01	6	4 (8) (4)	11000	017
Canton	C02	6	4 (6) (8)	11315	021

Attachment 9-1: City and Town List, page 1 of 7

CITY/TOWN	CITY/TOWN CODES For BDEPT#	Present District #	Previous District #	PLACE	COUNTY
Carlisle	C03	4	4	11525	017
Carver	C04	5	7	11665	023
Charlemont	C05	1	2	12505	011
Charlton	C06	3	3	12715	027
Chatham	C07	5	7	12995	001
Chelmsford	C08	4	4	13135	017
CHELSEA	C09	6	4 (8)	13205	025
Cheshire	C10	1	1	13345	003
Chester	C11	1	1	13485	013
Chesterfield	C12	1	2	13590	015
CHICOPEE	C13	2	2	13660	013
Chilmark	C14	5	7	13800	007
Clarksburg	C15	1	1	14010	003
Clinton	C16	3	3	14395	027
Cohasset	C17	5	7	14640	021
Colrain	C18	1	2	14885	011
Concord	C19	4	4	15060	017
Conway	C20	1	2	15200	011
Cummington	C21	1	2	16040	015
Dalton	D01	1	1	16180	003
Danvers	D03	4	5	16250	009
Dartmouth	D04	5	6	16425	005
Dedham	D05	6	4 (6)	16495	021
Deerfield	D06	2	2	16670	011
Dennis	D07	5	7	16775	001
Dighton	D08	5	6	16950	005
Douglas	D09	3	3	17300	027
Dover	D10	6	4 (6)	17405	021
Dracut	D11	4	4	17475	017
Dudley	D12	3	3	17685	027
Dunstable	D13	3	4	17825	017
Duxbury	D14	5	7	17895	023
E. Bridgewater	E01	5	7	18455	023
E. Brookfield	E02	3	3	18560	027
E. Longmeadow	E03	2	2	19645	013
Eastham	E04	5	7	19295	001
Easthampton	E05	2	2	19330	015
Easton	E06	5	6	20100	005
Edgartown	E07	5	7	21150	007
Egremont	E08	1	1	21360	003
Erving	E10	2	2	21780	011
Essex	E11	4	5	21850	009
EVERETT	E12	4	8 (4)	21990	017
Fairhaven	F01	5	6	22130	005
FALL RIVER	F02	5	6	23000	005
Falmouth	F03	5	7	23105	001
FITCHBURG	F04	3	3	23875	027
Florida	F05	1	1	24120	003
Foxborough	F06	5	6	24820	021
Framingham	F07	3	4	24925	017
Franklin	F08	3	6	25065	021

CITY/TOWN	CITY/TOWN CODES For BDEPT#	Present District #	Previous District #	PLACE	COUNTY
Freetown	F09	5	6 (7)	25240	005
GARDNER	G01	3	3	25485	027
Gay Head	G02	5	7	25555	007
Georgetown	G03	4	5	25625	009
Gill	G04	2	2	25730	011
GLOUCESTER	G05	4	5	26150	009
Goshen	G06	1	2	26290	015
Gosnold	G07	5	7	26325	007
Grafton	G08	3	3	26430	027
Granby	G09	2	2	26535	015
Granville	G10	1	2	26675	013
Gr. Barrington	G11	1	1	26815	003
Greenfield	G12	2	2	27025	011
Groton	G14	3	4	27480	017
Groveland	G15	4	5	27620	009
Hadley	H01	2	2	27690	015
Halifax	H02	5	7	27795	023
Hamilton	H03	4	5	27900	009
Hampden	H04	2	2	28075	013
Hancock	H05	1	1	28180	003
Hanover	H06	5	7	28285	023
Hanson	H07	5	7	28495	023
Hardwick	H08	2	3 (2)	28740	027
Harvard	H09	3	3	28950	027
Harwich	H10	5	7	29020	001
Hatfield	H11	2	2	29265	015
HAVERHILL	H12	4	5	29405	009
Hawley	H13	1	2	29475	011
Heath	H14	1	2	29650	011
Hingham	H15	5	7 (6)	30210	023
Hinsdale	H16	1	1	30315	003
Holbrook	H17	5	6	30455	021
Holden	H18	3	3	30560	027
Holland	H19	2	3	30665	013
Holliston	H20	3	4	30700	017
HOLYOKE	H21	2	2	30840	013
Hopedale	H22	3	3	30945	027
Hopkinton	H23	3	4 (3)	31085	017
Hubbardston	H24	3	3	31435	027
Hudson	H25	3	4	31540	017
Hull	H26	5	7	31645	023
Huntington	H27	1	1	31785	015
Ipswich	I01	4	5	32310	009
Kingston	K01	5	7	33220	023
Lakeville	L01	5	7 (6)	33920	023
Lancaster	L02	3	3	34165	027
Lanesborough	L03	1	1	34340	003
LAWRENCE	L04	4	5	34550	009
Lee	L05	1	1	34655	003
Leicester	L06	3	3	34795	027
Lenox	L07	1	1	34970	003

CITY/TOWN	CITY/TOWN CODES For BDEPT#	Present District #	Previous District #	PLACE	COUNTY
LEOMINSTER	L08	3	3	35075	027
Leverett	L09	2	2	35180	011
Lexington	L10	4	4	35215	017
Leyden	L11	2	2	35285	011
Lincoln	L12	4	4	35425	017
Littleton	L13	3	4	35950	017
Longmeadow	L14	2	2	36300	013
LOWELL	L15	4	4	37000	017
Ludlow	L16	2	2	37175	013
Lunenburg	L17	3	3	37420	027
LYNN	L18	4	5 (8)	37490	009
Lynnfield	L19	4	5 (4)	37560	009
MALDEN	M01	4	8 (5)	37875	017
Manchester	M02	4	5	37945	009
Mansfield	M03	5	6	38225	005
Marblehead	M04	4	5	38400	009
Marion	M05	5	7	38540	023
MARLBOROUGH	M06	3	4 (3)	38715	017
Marshfield	M07	5	7	38855	023
Mashpee	M08	5	7	39100	001
Mattapoisett	M09	5	7	39450	023
Maynard	M10	3	4	39625	017
Medfield	M11	3	6	39765	021
MEDFORD	M12	4	8 (4)	39835	017
Medway	M13	3	6	39975	021
MELROSE	M14	4	4	40115	017
Mendon	M15	3	3	40255	027
Merrimac	M16	4	5	40430	009
METHUEN	M17	4	5	40675	009
Middleborough	M18	5	7	40850	023
Middlefield	M19	1	1	40990	015
Middleton	M20	4	5	41095	009
Milford	M21	3	3 (6)	41165	027
Millbury	M22	3	3	41340	027
Millis	M23	3	6	41515	021
Millville	M24	3	3	41585	027
Milton	M25	6	4 (8) (6)	41690	021
Monroe	M26	1	2	42040	011
Monson	M27	2	3	42145	013
Montague	M28	2	2	42285	011
Monterey	M29	1	1	42460	003
Montgomery	M30	1	1	42530	013
Mt. Washington	M31	1	1	43300	003
Nahant	N01	4	5	43580	009
Nantucket	N02	5	7	43790	019
Natick	N03	3	4	43895	017
Needham	N04	6	4 (6)	44105	021
New Ashford	N05	1	1	44385	003
NEW BEDFORD	N06	5	6	45000	005
New Braintree	N07	2	3 (2)	45105	027
New Marlborough	N08	1	1	45420	003

CITY/TOWN	CITY/TOWN CODES For BDEPT#	Present District #	Previous District #	PLACE	COUNTY
New Salem	N09	2	2	45490	011
Newbury	N10	4	5	45175	009
NEWBURYPORT	N11	4	5	45245	009
NEWTON	N12	6	4 (4) (6)	45560	017
Norfolk	N13	5	6	46050	021
N. ADAMS	N14	1	1	46225	003
N. Andover	N15	4	5	46365	009
N. Attleboro	N16	5	6	46575	005
N. Brookfield	N17	3	3	47135	027
N. Reading	N18	4	4	48955	017
NORTHAMPTON	N19	2	2	46330	015
Northborough	N20	3	3	46820	027
Northbridge	N21	3	3	46925	027
Northfield	N22	2	2	47835	011
Norton	N23	5	6	49970	005
Norwell	N24	5	7	50145	023
Norwood	N25	5	6	50250	021
Oak Bluffs	O01	5	7	50390	007
Oakham	O02	3	3	50670	027
Orange	O03	2	2 (3)	51265	011
Orleans	O04	5	7	51440	001
Otis	O05	1	1	51580	003
Oxford	O06	3	3	51825	027
Palmer	P01	2	3	52105	013
Paxton	P02	3	3	52420	027
PEABODY	P03	4	5	52490	009
Pelham	P04	2	2	52560	015
Pembroke	P05	5	7	52630	023
Pepperell	P06	3	4	52805	017
Peru	P07	1	1	53050	003
Petersham	P08	2	3	53120	027
Phillipston	P09	2	3	53225	027
PITTSFIELD	P10	1	1	53960	003
Plainfield	P11	1	2	54030	015
Plainville	P12	5	6	54100	021
Plymouth	P13	5	7	54310	023
Plympton	P14	5	7	54415	023
Princeton	P16	3	3	55395	027
Provincetown	P17	5	7	55500	001
QUINCY	Q01	6	4 (8) (6)	55745	021
Randolph	R01	6	4 (6)	55955	021
Raynham	R02	5	6 (7)	56060	005
Reading	R03	4	4	56130	017
Rehoboth	R04	5	6	56375	005
REVERE	R05	4	8	56585	025
Richmond	R06	1	1	56795	003
Rochester	R07	5	7	57600	023
Rockland	R08	5	7	57775	023
Rockport	R09	4	5	57880	009
Rowe	R10	1	2	58335	011
Rowley	R11	4	5	58405	009

CITY/TOWN	CITY/TOWN CODES For BDEPT#	Present District #	Previous District #	PLACE	COUNTY
Royalston	R12	2	3	58580	027
Russell	R13	1	1	58650	013
Rutland	R14	3	3	58825	027
SALEM	S01	4	5	59105	009
Salisbury	S02	4	5	59245	009
Sandisfield	S03	1	1	59665	003
Sandwich	S04	5	7	59735	001
Saugus	S05	4	5 (8)	60015	009
Savoy	S06	1	1	60225	003
Scituate	S07	5	7	60330	023
Seekonk	S08	5	6	60645	005
Sharon	S09	5	6	60785	021
Sheffield	S10	1	1	61065	003
Shelburne	S11	1	2	61135	011
Sherborn	S12	3	4	61380	017
Shirley	S13	3	4	61590	017
Shrewsbury	S14	3	3	61800	027
Shutesbury	S15	2	2	61905	011
Somerset	S16	5	6	62430	005
SOMERVILLE	S17	4	6(4) (8)(4)	62535	017
S. Hadley	S18	2	2	64145	015
Southampton	S19	2	2	62745	015
Southborough	S20	3	3	63165	027
Southbridge	S21	3	3	63270	027
Southwick	S22	2	2	65825	013
Spencer	S23	3	3	66105	027
SPRINGFIELD	S24	2	2	67000	013
Sterling	S25	3	3	67385	027
Stockbridge	S26	1	1	67595	003
Stoneham	S27	4	4	67665	017
Stoughton	S28	5	6	67945	021
Stow	S29	3	4	68050	017
Sturbridge	S30	3	3	68155	027
Sudbury	S31	3	4	68260	017
Sunderland	S32	2	2	68400	011
Sutton	S33	3	3	68610	027
Swampscott	S34	4	5	68645	009
Swansea	S35	5	6	68750	005
TAUNTON	T01	5	6	69170	005
Templeton	T02	2	3	69275	027
Tewksbury	T03	4	4	69415	017
Tisbury	T04	5	7	69940	007
Tolland	T05	1	2	70045	013
Topsfield	T06	4	5	70150	009
Townsend	T07	3	4	70360	017
Truro	T08	5	7	70605	001
Tyngsborough	T09	4	4	71025	017
Tyringham	T10	1	1	71095	003
Upton	U01	3	3	71480	027
Uxbridge	U02	3	3	71620	027
Wakefield	W01	4	4 (5)	72215	017

CITY/TOWN	CITY/TOWN CODES For BDEPT#	Present District #	Previous District #	PLACE	COUNTY
Wales	W02	2	3	72390	013
Walpole	W03	5	6	72495	021
WALTHAM	W04	4	4	72600	017
Ware	W05	2	2	72880	015
Wareham	W06	5	7	72985	023
Warren	W07	2	3	73090	027
Warwick	W08	2	2	73265	011
Washington	W09	1	1	73335	003
Watertown	W10	6	4	73405	017
Wayland	W11	3	4	73790	017
Webster	W12	3	3	73895	027
Wellesley	W13	6	4 (6) (4)	74175	021
Wellfleet	W14	5	7	74385	001
Wendell	W15	2	2	74525	011
Wenham	W16	4	5	74595	009
W. Boylston	W17	3	3	75155	027
W. Bridgewater	W18	5	7 (6)	75260	023
W. Brookfield	W19	2	3 (2)	75400	027
W. Newbury	W20	4	5	77150	009
W. Springfield	W21	2	2	77850	013
W. Stockbridge	W22	1	1	77990	003
W. Tisbury	W23	5	7	78235	007
Westborough	W24	3	3	75015	027
WESTFIELD	W25	2	2	76030	013
Westford	W26	3	4	76135	017
Westhampton	W27	2	2	76380	015
Westminster	W28	3	3	77010	027
Weston	W29	6	4	77255	017
Westport	W30	5	6	77570	005
Westwood	W31	6	4 (6)	78690	021
Weymouth	W32	6	4 (6)	78865	021
Whately	W33	2	2	79110	011
Whitman	W34	5	7	79530	023
Wilbraham	W35	2	2	79740	013
Williamsburg	W36	1	2	79915	015
Williamstown	W37	1	1	79985	003
Wilmington	W38	4	4	80230	017
Winchendon	W39	2	3	80405	027
Winchester	W40	4	4	80510	017
Windsor	W41	1	1	80685	003
Winthrop	W42	6	4 (8)	80930	025
WOBURN	W43	4	4	81035	017
WORCESTER	W44	3	3	82000	027
Worthington	W45	1	1	82175	015
Wrentham	W46	5	6	82315	021
Yarmouth	Y01	5	7	82525	001

CHAPTER 10
SUPPLEMENTAL INFORMATION

10.1 INTRODUCTION

This chapter shall be a collection of Supplemental Memorandums expanding topics that require further explanation. Each supplement shall be contained in a subsequent section starting in section 10.2 and shall contain the title of the supplement and the date of issuance.

For example, 10.X Supplement on XYZ Topic/Item dated month/day/year. The issuer of the supplement memorandum shall always be the Bridge Inspection Engineer or the State Bridge Engineer. The supplement may also be in the form of an email sent to all individuals participating in the Bridge Inspection Program. All supplements shall be summarized in the table below and shall be continually updated in the table as well as in the succeeding sections.

Supplemental Memorandum Log Index		
Section Number	**Supplemental Item**	**Date of Issue**
Section 10.2	Coding for Multi beam bridges	05/01/2009
Section 10.3	Team Member Initials on Inspection reports	11/01/2009
Section 10.4	Superstructure Coding for NE Bulb Tee Pre-stressed Girder Bridges	01/15/2010
Section 10.5	Shielding Reporting and Coding	02/16/2011
Section 10.6	Coding Clarification for Parapets and Bridge Railing	11/12/2013
Section 10.7	Inspect What You Can…When It Is Due!	11/17/2014
Section 10.8	BRI: Definitions and Method of Measuring Length of Span	4/6/16
Section 10.9	NBIS Data Uploading Process Change	9/25/17

Chart 10-1: Supplemental Memorandum Log Index

10.2 CODING FOR MULTI BEAM BRIDGES ISSUED 5/1/09

THE COMMONWEALTH OF MASSACHUSETTS
MASSACHUSETTS HIGHWAY DEPARTMENT
INTEROFFICE MEMORANDUM

TO: Bridge Inspection Staff

THRU: Alexander K. Bardow, P.E., Director of Bridges and Structures

FROM: Brian B. Clang, P.E., Bridge Inspection Engineer

DATE: May 1, 2009

RE: Coding for Multi Beam Bridges

There has been a bit of inconsistency with the inspection reporting for multi beam or multi girder bridges. I have noticed that inspectors will use either Item 59.1 Stringers or Item 59.4 Girders or Beams on their reports for these types of structures. This memo is an attempt to standardize our approach to coding these elements.

I recommend that longitudinal elements that span from superstructure to superstructure should be called Stringers (Item 59.1), whereas longitudinal elements that span from substructure to substructure should be called either Beams or Girders (Item 59.4).

In some cases how you define the supporting elements can get a little complicated. How should we define cross girders or bents? Should they be defined as superstructure or substructure? The key for me is the presence of bearings. Cross girders that are supported by bearings should be considered superstructure elements. The element that supports the bearings would be the substructure for that system. Bents should be considered to be substructure units.

The classic case for the use of stringer coding will be in a stringer/floorbeam structural system such as on trusses. The floorbeams are obviously considered to be superstructure elements. For Beam/Girder descriptions I offer the following clarification. If the beam/girder element is a rolled beam shape, then it should be referred to as "beam". If the beam/girder element is made of built-up components/shapes (welded, riveted, or bolted), then it should be referred to as "girder". A pre-stressed AASHTO type IV beam should be coded as a "beam". A larger pre-stressed shape like a New England Bulb Tee should be coded as a "girder".

There are probably structural systems that do not fit the above descriptions. For such cases use your best judgment based upon the guidelines offered above.

BBC/bbc

Attachment 10-2: Coding for Multi Beam Bridges Supplement dated 5/01/09

10.3 TEAM MEMBER INTIALS ON INSPECTION REPORTS ISSUED 11/1/09

THE COMMONWEALTH OF MASSACHUSETTS
MASSDOT, HIGHWAY DIVISION
INTEROFFICE MEMORANDUM

TO: Bridge Inspection Staff

THRU: Alexander K. Bardow, P.E., Director of Bridges and Structures

FROM: Brian B. Clang, P.E., Bridge Inspection Engineer

DATE: November 1, 2009

RE: Team Member initials on Inspection Reports

Effective this date all inspection reports completed shall be initialed by each Team Member who assisted the Team Leader with the inspection. By initialing the report the Team Member confirms that he/she participated during the inspection and that the individual has read the final inspection report.

BBC/bbc

Attachment 10-3: Team Member Initials on Inspection Reports Supplement dated 11/01/09

10.4 SUPERSTRUCTURE CODING FOR NE BULB TEE PRE-STRESSED GRIDER BRIDGES ISSUED 1/15/10

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TRANSPORTATION – HIGHWAY DIVISION
INTEROFFICE MEMORANDUM

TO: Bridge Inspection Staff

THRU: Alexander K. Bardow, P.E., Director of Bridges and Structures

FROM: Brian B. Clang, P.E., Bridge Inspection Engineer

DATE: January 15, 2010

RE: Superstructure Coding for NE Bulb Tee Pre-stressed Girder Bridges

There has been a bit of confusion about the correct coding for Pre-stressed concrete New England Bulb Tee girder superstructures. I have been advised that inspectors have questions on the correct coding for Item 43 – Structure Type. This memo will clarify our position.

Item 43 is a three digit entry. The first digit (material) is straight forward: either 5 - Pre-stressed concrete, or 6 - Continuous pre-stressed concrete. The confusion is in the second and third digit (design type). Inspectors have considered using either 02 – Girder, or 04 - Tee beam. The interest in calling it a tee beam bridge may lie in the name of the beam shape: bulb tee.

Please be advised that the correct coding for a New England Bulb Tee design type is "Girder". The proper coding for Item 43 would be either 502 or 602.

BBC/bbc

Attachment 10-4: Superstructure Coding for NE bulb Tee Pre-stressed Girder Bridges Supplement dated 1/15/10

10.5 SHIELDING REPORTING AND CODING ISSUED 2/16/11

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TRANSPORTATION – HIGHWAY DIVISION
INTEROFFICE MEMORANDUM

TO: Bridge Inspection Staff

THRU: Alexander K. Bardow, P.E., Director of Bridges and Structures

FROM: Brian B. Clang, P.E., Bridge Inspection Engineer

DATE: February 16, 2011

RE: Shielding Reporting and Coding

It has become more common for District Bridge Maintenance to install shielding on the underside of bridges over roadways where there is potential for spalling concrete falling onto traveled ways below. I feel that the shielding should be identified on our inspection reports: type, location and overall condition.

For the time being please create a new Deck sub element no. **58.14 - Shielding** on page 1 of your reports. Indicate a numerical condition rating and deficiency coding on page 1 as appropriate and provide a written description in the text portion of the report (even if the condition is better than fair). The written description should at a minimum indicate the type of shielding used (material) and the limits. The main shielding materials in use are as follows:

Timber
Expanded Metal
Fabric Wrap

It is hoped that consistent reporting will allow accurate searches for shielded bridges when necessary. Please be sure to use one of the underlined words when describing the shielding material, allowing us to search for the key words. If other materials are in use indicate the materials as appropriate. Shortly we hope to have sub element 58.14 added into the 4D reports.

Thank you for your cooperation.

BBC/bbc

Attachment 10-5: Shielding Reporting and Coding Supplement dated 2/16/11

10.6 CODING CLARIFICATION FOR PARAPETS AND BRIDGE RAILING ISSUED 11/12/13

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
INTEROFFICE MEMORANDUM

TO: Bridge Inspection Staff

THRU: Alexander K. Bardow, P.E., State Bridge Engineer

FROM: Brian B. Clang, P.E., Bridge Inspection Engineer

DATE: November 12, 2013

RE: Coding Clarification for Parapets and Bridge Railing

There has been a bit of inconsistency with inspection reporting for parapets and bridge railing. The confusion may exist because popular bridge inspection references have historically used the terms interchangeably. For instance the FHWA's Bridge Inspector's Training Manual 90, under Section 7.7.1 Bridge Barriers list examples of bridge railings that include solid concrete parapets and steel and aluminum railings. It also presents Figure 7-15 which shows a pigeonhole parapet as an example of a bridge railing.

A general rule of thumb is offered for determining if any given bridge barrier is a parapet or a railing: "If you can pass your arm through the barrier system than it is a railing. If you cannot, then it is a parapet." For example, the S3-TL4 (three rails with or without pickets) railing is obviously a railing and a CF-PL2 (solid concrete "Jersey" barrier) is a parapet. The CT-TL2 (concrete "Texas" rail) would be a railing because of the openings.

There are many situations where we do have both parapets and railings, such as a single steel rail mounted on a low concrete parapet. Another example would be when a railing is mounted on a concrete base. In such cases we would prefer that the rail be coded as a railing and the base be coded as a parapet.

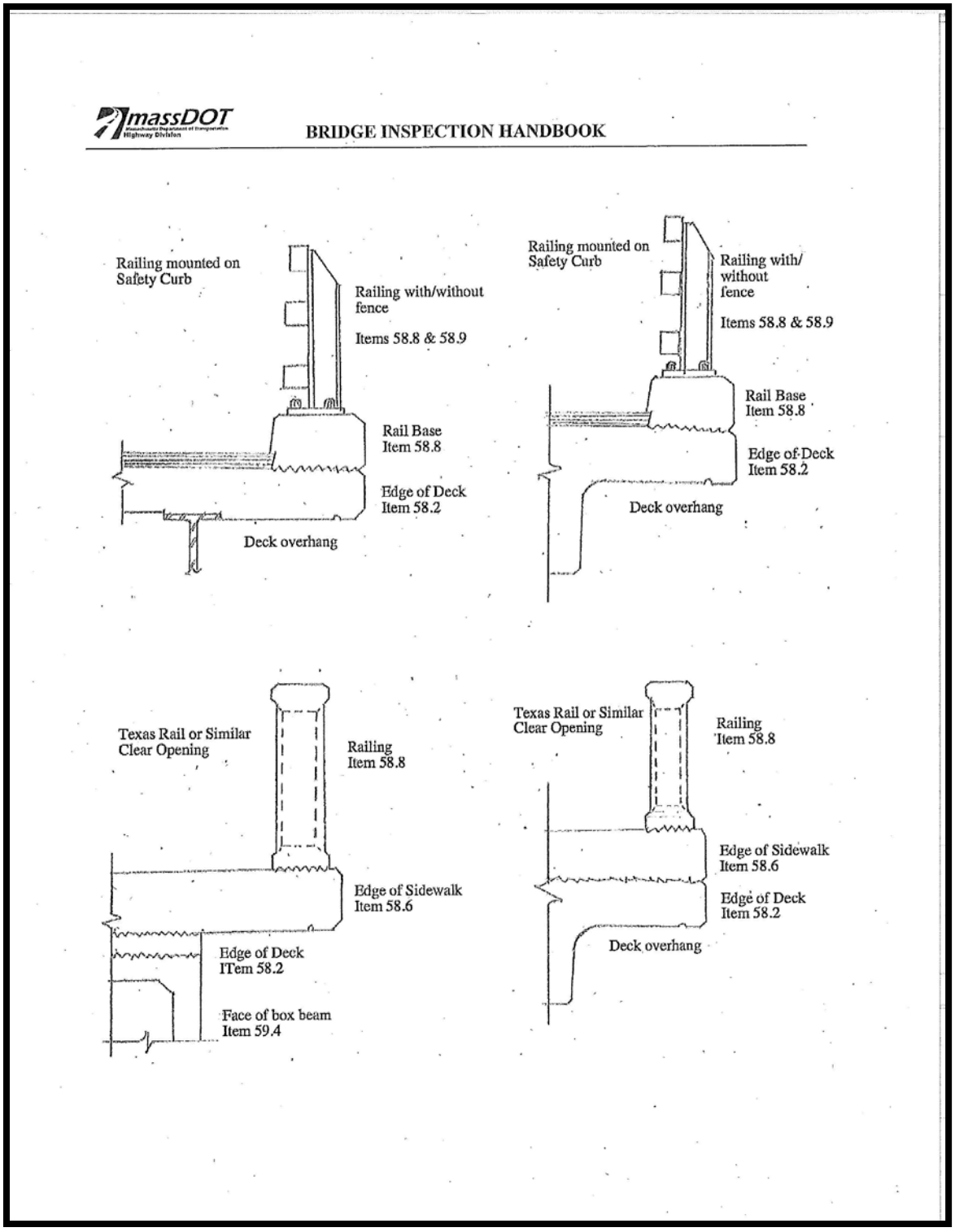
Attached is a series of sketches of some of the more typical bridge rail systems in use in Massachusetts with our recommended coding of components.

There are definitely bridge rail systems that do not fit the above descriptions. For such cases use your best judgment based upon the guidelines offered in the attachment.

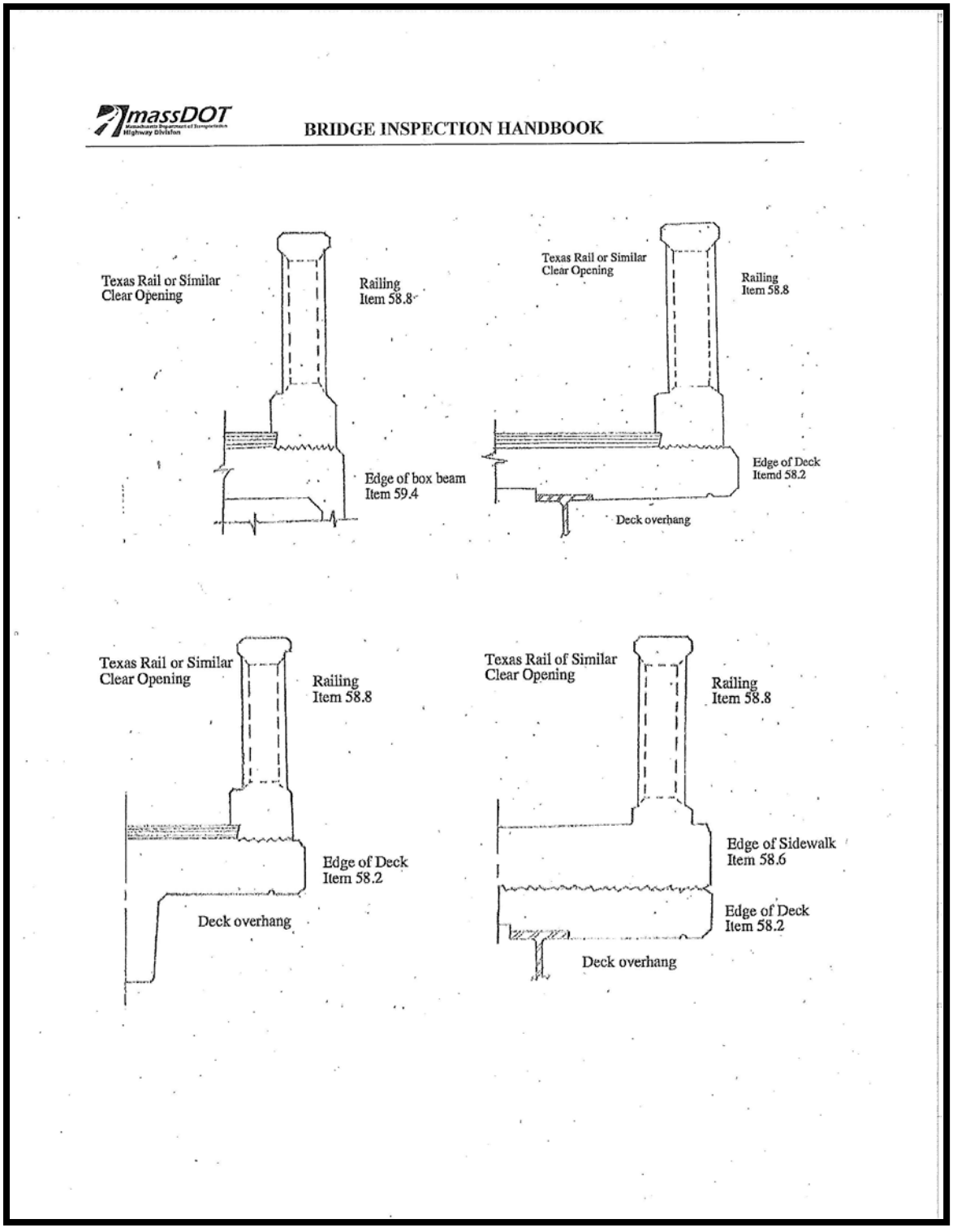
Thank you for working with me to standardize our NBIS coding.

BBC/bbc

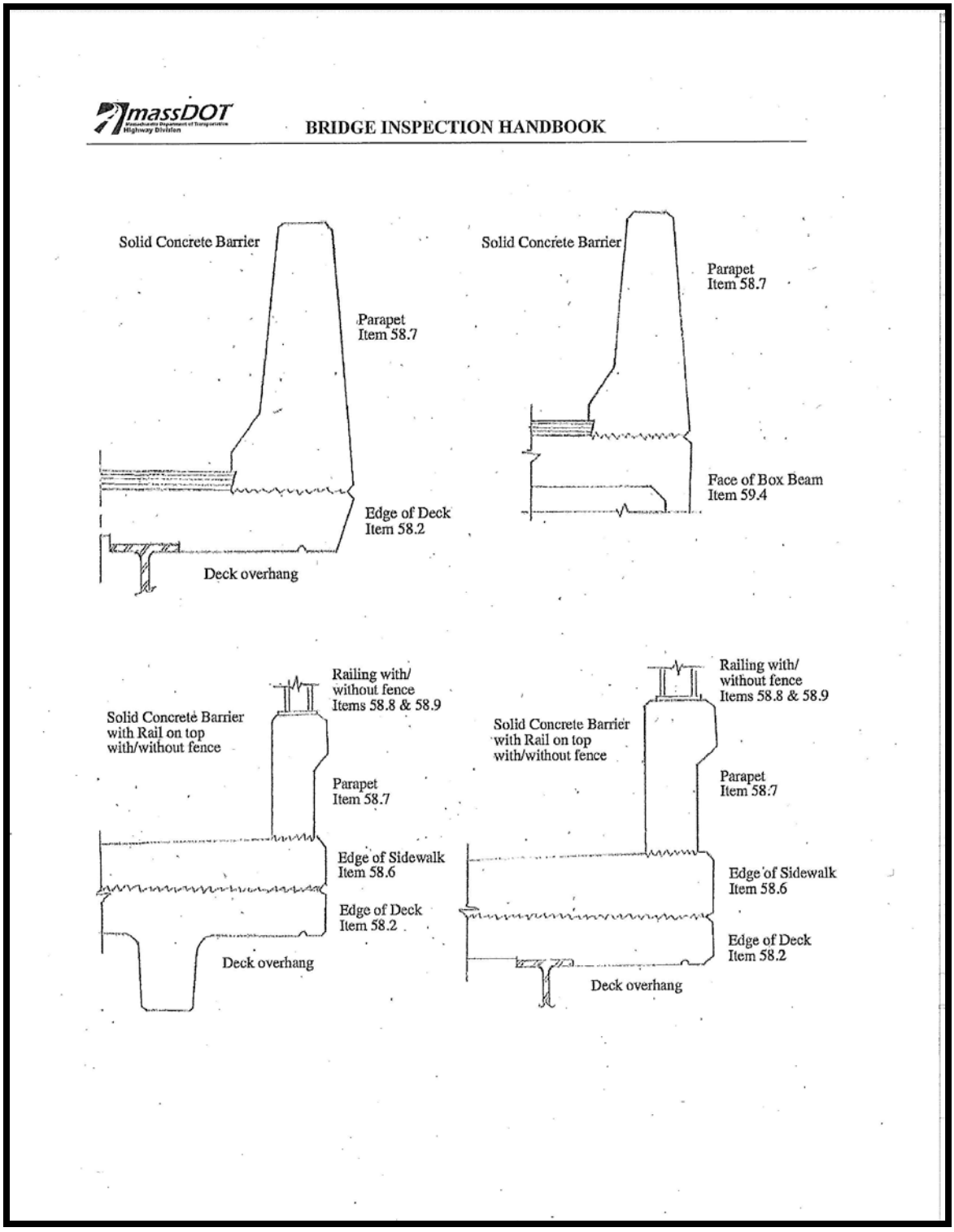
Attachment

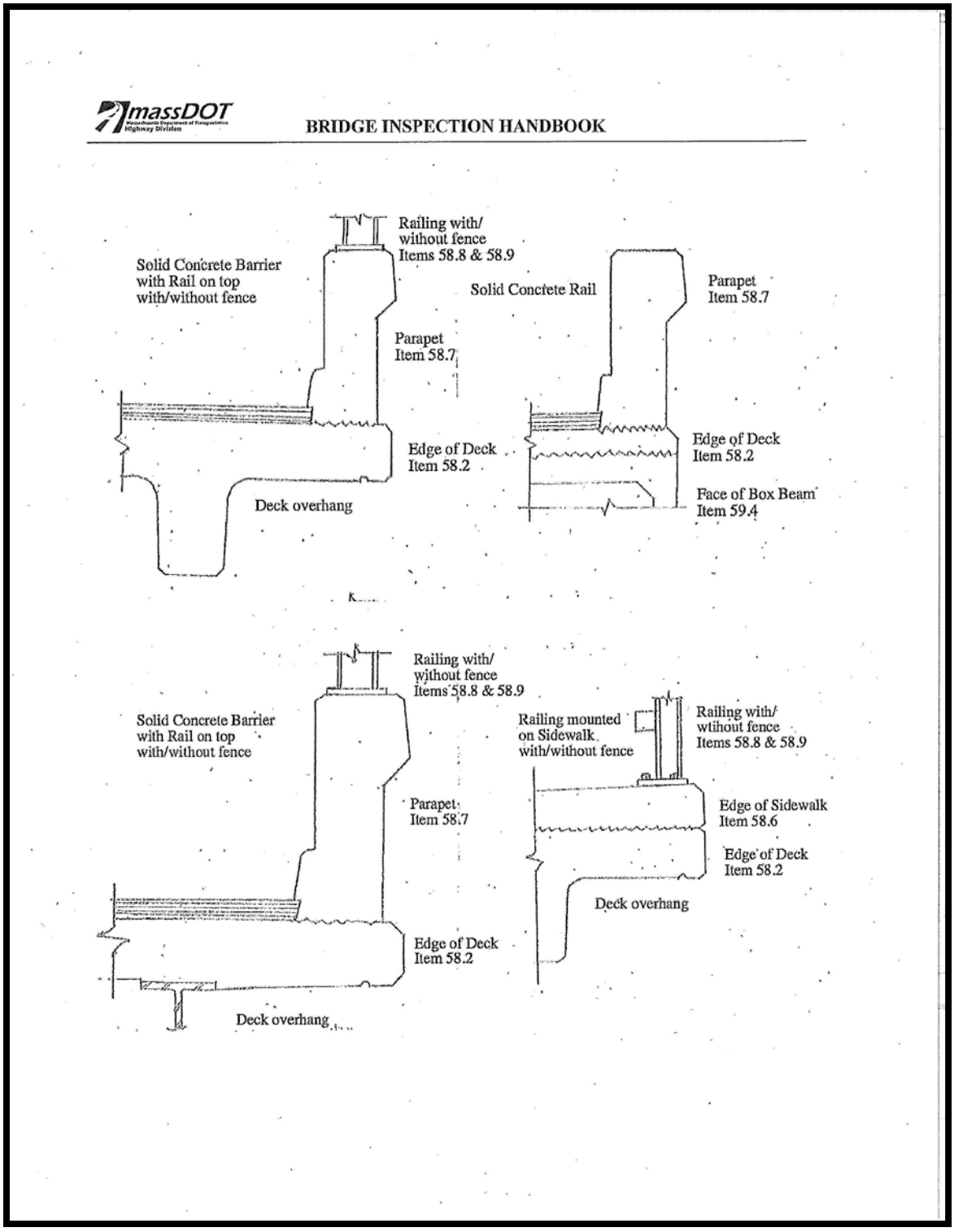


Attachment 10-6: Coding Supplement for Parapets and Bridge Railing dated 11/12/13, Page 2 of 5



Attachment 10-6: Coding Supplement for Parapets and Bridge Railing dated 11/12/13, Page 3 of 5


massDOT
Massachusetts Department of Transportation
Highway Division
BRIDGE INSPECTION HANDBOOK
Solid Concrete Barrier
Parapet
Item 58.7
Edge of Deck
Item 58.2
Deck overhang
Solid Concrete Barrier
Parapet
Item 58.7
Face of Box Beam
Item 59.4
Railing with/
without fence
Items 58.8 & 58.9
Solid Concrete Barrier
with Rail on top
with/without fence
Parapet
Item 58.7
Edge of Sidewalk
Item 58.6
Edge of Deck
Item 58.2
Deck overhang
Railing with/
without fence
Items 58.8 & 58.9
Solid Concrete Barrier
with Rail on top
with/without fence
Parapet
Item 58.7
Edge of Sidewalk
Item 58.6
Edge of Deck
Item 58.2
Deck overhang



Attachment 10-6: Coding Supplement for Parapets and Bridge Railing dated 11/12/13, Page 5 of 5

10.7 INSPECT WHAT YOU CAN …WHEN IT IS DUE ISSUED 11/17/14

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
INTEROFFICE MEMORANDUM

TO: Bridge Inspection Staff

THRU: Alexander K. Bardow, P.E., State Bridge Engineer

FROM: Brian B. Clang, P.E., Bridge Inspection Engineer

DATE: November 17, 2014

RE: Inspect What You Can… When It Is Due!

Often access to bridges for our safety inspections is delayed or interrupted. Typical examples include Railroad right-of-way access permit delays and active construction operations/phasing. Other reasons could include high water flows or heavy snow accumulation. I would like to remind all that our safety inspections should be completed when they are due as per NBIS and MassDOT criteria.

If any portion of the structure can still be accessed during the month that the NBIS inspection is due then proceed with the inspection. Whatever cannot be inspected during that month will have to be put off until access is possible or is granted. An inspection report should be prepared for the elements inspected. A comment should be included in the general comments section of the report describing the areas of the bridge that were not inspected at this time and the reason for the delay. The inspection report should carry the first date that the field inspection was started.

If the follow up inspection is within the next month then the inspectors should hold off completing the report until all of the condition information is obtained. The completed inspection report should carry the first date that the field inspection was started, not the follow up date.

If the follow up inspection is expected to be later than the next month then the TL should complete the inspection report as is. Items 58, 59, 60 and 62 should be coded for the conditions noted during the first inspection. The Team Leader should return to the bridge when access is available and complete an "Other" inspection report for the areas of the bridge not accessed previously. When assigning condition ratings for Items 58, 59, 60 or 62 as applicable at the completion of the Other Inspection the team should consider the entire bridge, not just the areas inspected during the follow-up inspection.

Thank you for working with me to ensure timely safety inspections and compliance with NBIS and MassDOT inspection frequency criteria.

Attachment 10-7: Inspect What You Can…When It Is Due dated 11/17/14

10.8 BRI: DEFINITIONS AND METHOD OF MEASURING LENGTH OF SPAN ISSUED 4/6/16

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
INTEROFFICE MEMORANDUM

TO: Bridge Inspection Staff

THRU: Brian B. Clang, P.E., Bridge Inspection Engineer

FROM: Alexander K. Bardow, P.E., State Bridge Engineer

DATE: April 6, 2016

RE: **BRI: Definitions and Method of Measuring Length of Span**

As part of MassDOT's BRI inspection program and in anticipation of the Municipal Bridge Program, I have put together guidance on how to determine if a bridge is a BRI. The information contained within this memorandum gives a definition of BRI, provides relevant references, and provides guidance on how and where to measure the span length to determine if a structure is a BRI, NBI or not. The intent is to make sure that everybody is going about determining BRI's consistently.

Since this guidance is going out after the start of our BRI inspections, those bridges that have been inspected and are currently in the inventory as BRIs would have to be re-measured in compliance with these guidelines.

BRI: Definitions and Method of Measuring Length of Span

What is a BRI?

A "BRI" is a highway bridge structure that meets the Massachusetts General Laws (MGL) definition of a bridge but not the federal definition of a bridge. MGL recognize structures having a span greater than 10 feet as bridges, but federal regulations define a bridge as a structure having a span greater than 20 feet. MassDOT uses the category code of "BRI" in order to identify and track MGL definition bridges in its inventory.

References

MGL Chapter 85 Section 35 (relevant provisions):

> *No bridge on a public highway having a span in excess of ten feet, … , shall be constructed or reconstructed by any county or town except in accordance with plans and specifications therefor approved by the department. Said department shall approve or alter to meet its approval all such plans submitted to it and shall determine the maximum load which any such bridge may safely carry…*

Page **1** of **5**

Attachment 10-8: BRI: Definitions and Method of Measuring Length of Span, dated 4/6/16, Page 1 of 5

Federal regulations, 23CFR Part 650 Subpart C, National Bridge Inspection Standards (NBIS):

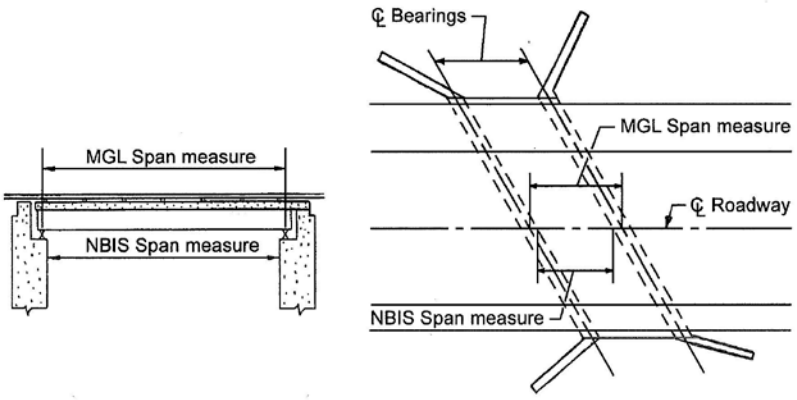
> *Bridge: A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening.*

How is a structure determined to be a BRI?

MGL Ch 85 Sec 35 only requires that a bridge have a span in excess of 10 feet. The engineering definition of the term "span" refers to the distance between adjacent centerlines of bearings. However, MGL Ch 85 Sec 35 is primarily concerned with authorizing MassDOT to approve bridge plans prepared by municipalities and to determine a bridge's safe load carrying capacity. As a result, it provides no guidance on where to measure the span, nor does it provide guidance on how to measure the span for structures that do not have defined centerlines of bearings, such as culverts, arch bridges or in the case of pipes that perform the function of a bridge. To address these questions, MassDOT defaults to the NBIS definition requirements.

Therefore, a BRI is determined as follows:

1. It must be on and carry a public highway.
2. All span measurements are taken along the centerline of the roadway.
3. For bridges that have defined centerlines of bearings, measure the total distance from the centerline of bearings on one abutment to the centerline of bearings on the other abutment. (See Figure 1)
4. For bridges that do not have defined centerlines of bearings, such as arches, culverts and those bridges where the ends of the beams are encased so that there is no centerline of bearings, measure the clear opening between the breastwalls of abutments, the spring lines of arches, or extreme ends of openings for multiple boxes. (See Figures 2a, 2b, 2c)
5. For bridges that consist of large size pipes, measure the maximum diameter of the pipe, or, in the case of multiple pipes, the maximum total distance across all pipes provided that the clear distance between pipes is less than half the diameter of the smaller contiguous pipe. (See Figure 3)



NOTE: Since the MGL Span and the NBIS Span measures are different, the MGL Span measure may exceed 20 feet while the NBIS Span measure may be less than 20 feet. In this instance, the bridge would still be considered a BRI because it does not meet federal definition of a bridge.

Figure 1: Bridges with Defined Centerlines of Bearings

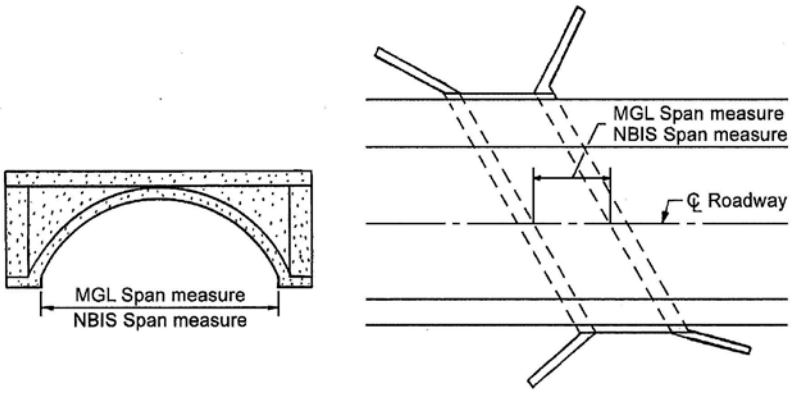
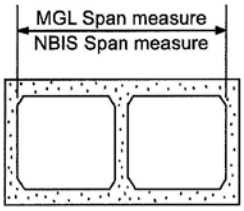
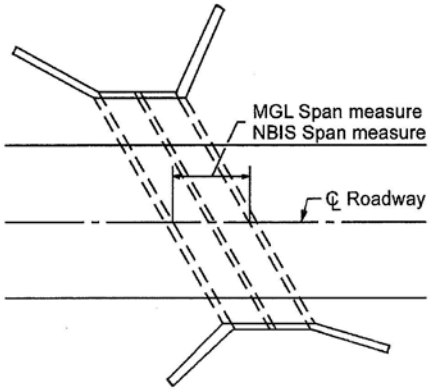


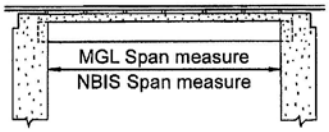
Figure 2a: Arch Type Bridges





NOTE: This also includes three sided frame type culverts.

Figure 2b: Culvert Type Bridges



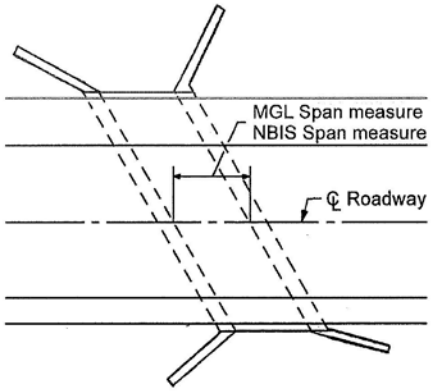
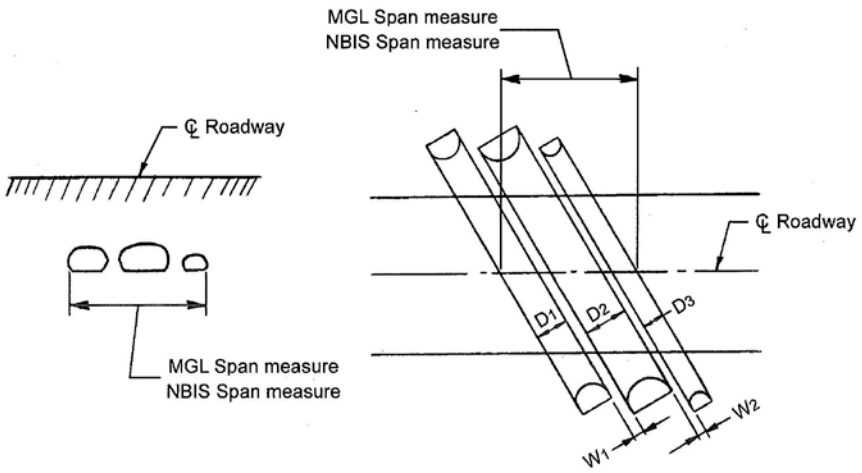


Figure 2c: Bridges without Defined Centerlines of Bearings

Page **4** of **5**



NOTE: In order for the MGL Span measure to be taken as shown above, W1 must be less than ½ D1 and ½ D2 and W2 must be less than ½ D2 and ½ D3. If, for instance, W2 were greater than ½ D3, then the span measure would only include D1, W1, and D2. This method of measure also applies to multiple opening Clapper type structures, where a stone slab sits on thick piers.

Figure 3: Multiple Pipe Culvert Structures

AKB/akb

Page **5** of **5**

10.9 NBIS DATA UPLOADING PROCESS CHANGE ISSUED 9/25/17

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
INTEROFFICE MEMORANDUM

TO: Bridge Inspection Personnel and Consultants

THRU: Alexander K. Bardow, P.E., State Bridge Engineer

FROM: Brian B. Clang, P.E., Bridge Inspection Engineer

DATE: September 25, 2017

RE: NBIS Data Uploading Process Change

In order to assure compliance with the FHWA National Bridge Inspection Program metric to have inspection data uploaded into 4D within 90 days of the inspection, we will be instituting a process change. Beginning September 29, 2017 pertinent NBI data will be automatically uploaded into 4D when an inspection report is marked "ready for review". This process change is necessary so that all inspection data, statewide, is uploaded into the bridge inspection database within the required time frame.

Note that only the Team Leader for the inspection or his or her DBIE will be able to check the report ready for review. Other inspectors assisting with the preparation of the report, such as Team Members will not be able to complete this step.

The Team Leader will be presented with a Confirmation dialog box containing a reminder that the action will update the SI&A and list the items to be updated. For example a Routine report will update items 41, 58, 59, 60, 61, 36A, 36B, 36C, 36D, and 90. The automatic upload will be completed for Routine, Routine Arch, Culvert, Fracture Critical, Special Member, Underwater and Underwater Low Clearance reports.

As you can surely appreciate, it is very important that the report is fully completed, that all coding data is complete and accurate when the Team Leader marks it ready for review.

The DBIE will still be able to make changes to the data if necessary following his or her review. When the DBIE completes the review of the report and approves it in 4D, any changed data from the original upload will be automatically revised as necessary.

Thank you for working with me to ensure compliance with NBIS criteria.

BBC/bbc

Attachment 10-9: NBIS Data Uploading Process Change, dated 9/25/17